THE IRON TRADE REVIEW

Volume XLV CLEVELAND, DECEMBER 23, 1909 Number 26

ORE SALES

MADE AT ADVANCE OF FIFTY CENTS ON BESSEMER.

Keen Competition in Some Districts on Pig Iron—Heavy Harriman Orders for Rails During Six Months.

Consumers of finished material have been so busy specifying on contracts which expire Jan. 1 that nearly all specifications are now in the hands of the mills, and there is a temporary lull in activity. Instances in which contracts will be cancelled at the beginning of the year on account of failure to specify will indeed be rare. Some buyers, especially users of steel bars, are endeavoring to contract for new year requirements, but selling interests are very cautious as to their policy, and some will not contract beyond the first quarter.

Iron Ore Prices

Opinions in regard to Lake Superior iron ore prices have crystallized slowly this year, and there has been less formality than usual in the consideration of the policy to govern the selling of the new ore. It has, however, been definitely decided by important interests that there will be an advance of 50 cents per ton on Bessemer grades and that there will be no change in the base guarantee of iron content of either Bessemer or non-Bessemer grades. No formal action has, however, been taken, but some sales of Bessemer have been made at the advance on which some interests have not expressed their views.

Corporation Production

Pig iron production of the Steel Corporation continues heavy, and it is understood that its output is now equal to the needs of the Corporation, in spite of the very heavy consumption. The American Steel & Wire Co. will begin at once the building of a modern blast furnace at its Central plant, Cleveland, where there are now three stacks, having an annual capacity of 510,000 tons.

Pig Iron Conditions

In addition to the heavy sales of pig iron made to pipe companies last week, some additional tonnages have been purchased and these companies are anxious to secure more of the lower grades. The general price of No. 2 foundry iron, Birmingham, is now $14 for the first quarter, and this price can be done for the first half. There are some soft spots in the market, and in the Pittsburg and Cleveland districts there has been some sharp competition, the minimum quotations being on a basis of $17, valley, for No. 2.

Railroad Buying

The Illinois Steel Co. reports sales of 31,000 tons of steel rails in addition to the Illinois Central tonnage previously reported. Purchases by the Harriman lines since June amount to over 200,000 tons. It is noteworthy, however, that purchases of steel rails by eastern lines have been limited this year. Many railroads have confined their buying largely to rolling stock, on which prices have been low. A number of railroads have placed orders for a fair tonnage of bridge material.

Structural Material

In the eastern territory, no very large contracts for structural material have been placed, but the aggregate tonnage of small orders is good. A Chicago contract for the south side baseball park, 1,000 tons, has been taken by George W. Jackson, and the Boston Store addition in that city, 4,000 tons, has been awarded to the South Halsted Street Iron Works. The placing of the contract for the municipal building, New York City, involving 25,000 tons, on which the Thompson-Starrett Co. was the lowest bidder, has been held up by an injunction.

Coke and Old Material

Some low prices on Connellsville coke are reported in eastern territory, but it is doubtful whether these quotations are on strictly high grade cokes, as in other sections prices of Connellsville coke are for the most part well maintained. In the scrap market, the principal event of the week has been the reduction to $17 of the price paid by the associated mills in the Philadelphia district for heavy melting steel.

STEEL WIRE MARKET

Will be Entered by the Cambria Steel Co.

The Cambria Steel Co. has announced authoritatively that it is preparing to enter the market on steel wire products. Plans have been perfected for some time, some machinery has been purchased and contracts have been made looking toward the establishment of a wire plant.

It is understood that the buildings, which will be erected in connection with the Johnstown, Pa., works, will be constructed by the company itself. Work will be commenced as soon as the weather will permit. Some of the contracts for the mill machinery have been let.

NEW STACK AT CLEVELAND.

New York, Dec. 22. (By wire.)

The American Steel & Wire Co. will proceed at once with the construction of another 500-ton blast furnace at the Central group at Cleveland, estimated to cost $1,250,000. This will increase the number of stacks at the Central group to four, or a total for the Cleveland district of six stacks, including one at Emma and the old Newburg stack, which has not been operated for some years.

THE WEEK IN IRON CENTERS

PITTSBURG.

Sentimental Improvement in Basic—Other Pig Iron Unchanged.

Office of THE IRON TRADE REVIEW,
510 Park Building, Dec. 22.

Specifications against contracts for finished material, notably steel bars, plates and shapes, have been sent in so liberally by buyers during the past few months that some slowing up in the movement after Jan. 1 would not be surprising to steel-makers. Much of the tonnage drawn against, which is to be shipped subject to the mills' convenience, is still to be rolled, since the mills are far behind in their deliveries, so that consumers now apparently in comfortable positions as to their needs will have considerable material regularly shipped to them over the first quarter, without their additional ordering. The incentive for the active specifying up to Jan. 1 has been the low prices at which the mills were obliged to supply buyers' needs under contracts placed earlier in the year.

Any diminution of the heavy ordering movement would be welcomed by makers, especially in steel bars, in which the mills have sufficient tonnage entered to keep them running into the second quarter. While some consumers have been covered for first half, contracts for second quarter requirements of bars have not been numerous. The mills are now more freely opening their books to this business and the market on forward selling seems more generally quotable at 1.50c, Pittsburg. The liberal specifying in sheets and tin plate, while not equal to that of November, is of extremely satisfactory proportions for a final month of the year. Leading makers of wire products report the year's outlook before that market to be very gratifying.

An interesting situation has developed in coke where the uncovered furnace buyers are making determined efforts to depress the current level of asking prices. Leading Connellsville manufacturers of coke are equally firm in their position to uphold the market and a condition similar to a deadlock has ensued which has brought with it an easier tone, though scarcely any weakness.

The National Tube Co. has decided upon a re-classification of the sizes on the present merchant pipe card and is about to announce a new list to be effective Jan. 1. The revision will involve some price changes which however, will not be uniform throughout the schedule.

Pig Iron.—The sentimental improvement in basic iron has come more into evidence the past week, but the other grades have shown no developments and are holding practically stationary in a market of quiet buying. There is anticipation of a renewal of consumers' interest in the market before the first quarter is far advanced. A favorable feature of the situation continues the active anticipations of shipments, notably in foundry iron.

The extent of the recent transferring of basic from some furnace interests and middlemen desiring to sell to stronger hands is currently reported to be from 18,000 to 20,000 tons, which was accepted at $17 valley or slightly less. The effect has been altogether sentimental as there is scarcely any open market demand for basic at the present time. A local steel foundry bought 1,000 tons through a middleman for first quarter shipment at $17.25 valley. The iron figuring in the recent transfers, as now held will go partly to apply upon running contracts and not a great amount of it is likely to overhang the future market.

Some users who have lately set out to shade the $19 valley price on Bessemer have met with little success and this business including the inquiry of a Cleveland foundry interest for 2,500 tons for first quarter is still pending. Sales of the week amount to about 4,000 tons in several lots for prompt shipment to a merchant interest at $19 valley. The iron will be diverted to regular customers.

There is very little new buying in foundry iron, current sales being limited to small lots for early needs, but the requests for delivery against requirement contracts, some of which are anticipations of portions of first quarter tonnage, are numerous. Sales of 200 tons of No. 2 for first quarter on a basis of $17.35 valley and of 600 tons of high sulphur iron for immediate shipment at $16.25 valley are noted. The prompt market is holding about $17.25 valley, but $17 valley has been recently done in some cases.

A little activity in low phosphorus iron in this territory has developed quite a wide spread in reported prices due to a variance in the grades involved. A steel foundry reports having bought 400 tons for early shipment at $22.25 delivered and another consumer took 200 tons at what is said to have been an extremely low price. Several sales aggregating 1,000 tons for first quarter at better than $24 Pittsburg are reported while some makers are asking $24.90 delivered on standard material. A large steel company is closely following the market and would probably take several thousand tons at a satisfactory price. The market on strictly standard low phosphorus seems quotable at from $23.75 to $24 Pittsburg.

The Fannie furnace at West Middlesex, Pa., which has been on Bessemer, has been blown out for six weeks for relining, and the Stewart furnace at Sharpsville, Pa., has been blown in on Bessemer. Cherry Valley and Leetonia are both on Bessemer.

For prompt and first quarter shipment on northern iron, we quote as follows:

Bessemer, valley	$ 19.00
Bessemer, Pittsburg	19.90
No. 2 foundry, Pittsburg	18.15 to 18.40
Gray Forge, Pittsburg	17.15 to 17.40
Basic, valley	17.25
Basic, Pittsburg	18.15

Ferro-Alloys.—Some selling is being done regularly in the alloy market, but the total volume is rather light. A little new inquiry has come out for ferro-manganese, principally in carload lots. The market in ferro-manganese is holding steady and any shading of quoted prices has resulted where a special effort was made to move lots on hand. We quote ferro-manganese at $45 to $45.50, Baltimore for immediate shipment or for first half, and from $45.50 to $46.50 for second half. The freight from Baltimore to Pittsburg is $1.95.

Fifty per cent ferro-silicon is quoted at $62.50 to $63.50, Pittsburg; domestic 12 per cent, $25.90; 11 per cent, $24.90; 10 per cent, $23.90, Pittsburg, for prompt, with $1 advance for first quarter and $2 for second quarter. The foreign grades are held at $1 or more a ton over domestic prices.

Plates.—While plate specifications are not as heavy as in November because of the declining year, there is a large tonnage of orders still being entered by the mills. Deliveries have moved up a little as a consequence and shipments can now be made by some of the independents in from two to three months. The prospects before the market in the way of car buying and other work are very promising, although new contracts at

present are comparatively few. A moderate amount of new car business is pending. Principal among this are 2,000 steel ore cars divided equally between the Duluth, Mesabi & Iron Range and the Duluth, Mesabi & Northern railroads. These cars will be equipped with steel wheels. The award for their construction will be placed within a few days. The Philadelphia & Reading has been inquiring for 2,500 box and gondola cars while the Wheeling & Lake Erie is considering the purchase of 1,500 freight cars. The Cornwall & Lebanon railroad has ordered 50 40-ton steel gondolas and 50 30-ton steel under-frame box cars from the Pressed Steel Car Co. The general level of the market remains 1.60c, though in special cases 1.55c may be done. We quote the market as follows:

Tank plates, ¼-inch thick, 6¼ to 100 inches, 1.55c to 1.60c. Extras are as follows, per 100 pounds: Boiler and flange steel plate, 0.10c; A. B. M. A. and ordinary firebox steel plates, 0.20c; still bottom steel, 0.20c; marine steel, 0.40c; locomotive firebox steel, 0.50c; all sketches, excepting straight taper plates varying not more than 4 inches in width at ends, narrowest end not being less than 30 inches, 0.10c; circles, 0.20c. Plates in widths over 100 inches up to 110 inches, 0.05c; over 110 inches up to 115 inches, 0.10c; over 115 inches up to 120 inches, 0.15c; over 120 inches up to 125 inches, 0.25c; over 125 inches up to 130 inches, 0.50c; over 130 inches, 1c. Gages under ½-inch to and including 3/16-inch plate on thin edge, 0.10c; under 3/16 to and including No. 9, 0.25c. Five cents extra for less than carloads. Terms, net cash in 30 days.

Sheets.—With the mills sold up for the first quarter and beyond and with deliveries on specifications now booked several months deferred, consumers in need of prompt material are having difficulty to meet their requirements and are paying premiums for early delivery. This premium is reported by makers to be about $2 a ton. Specifications against sheet contracts continue very heavy for December and with some companies are reaching the high mark of any previous final month. New business is moderate. There is some evidence in the market of consumers having trouble to get their material from their regular sources of supply owing to the congested condition of mills. The leading interest is still operating 163 hot mills or 88 per cent of capacity. We quote present prices as follows:

Blue annealed sheets, Nos. 3 to 8, 1.70c; Nos. 9 and 10, 1.75c; Nos. 11 and 12, 1.80c; Nos. 13 and 14, 1.85c; Nos. 15 and 16, 1.95c; box annealed sheets, Nos. 10 and 12, 2.05c; Nos. 13 and 14, 2.10c; Nos. 15 and 16, 2.15c; Nos. 17 to 21, 2.20c; Nos. 22 to 24, 2.25c; Nos. 25 and 26, 2.30c; No. 27, 2.35c; No. 28, 2.40c; No. 29, 2.45c; No. 30, 2.55c; galvanized sheets, Nos. 12 to 14, 2.50c to 2.55c; Nos. 15 and 16, 2.60c to 2.65c; Nos. 17 to 21, 2.75c; Nos. 22 to 24, 2.90c; Nos. 25 and 26, 3.10c; No. 27, 3.30c; No. 28, 3.50c; No. 29, 3.60c; No. 30, 3.85c; painted roofing sheets, $1.70 per square for No. 28 gage, 2½-inch corrugation, and galvanized roofing sheets, $3 per square for No. 28 gage, 2½-inch corrugation.

Tin Plate. — There is increased specifying by consumers against tin plate contracts and some of the leading users, including the can makers, are now entering orders for their needs. Makers have sold their outputs through the first quarter and in some cases through the first half, and as a consequence are taking little new business from the light offerings. The miscellaneous buyers of plate are specifying freely. The operations of the American Sheet & Tin Plate Co. this week are 173 hot mills or 76 per cent. We quote present tin plate prices as follows:

Coke tin plate, 100-pound basis, 14 x 20, $3.60 f. o. b. mill, Pittsburg district.

Rails and Track Material.—Local rail makers are steadily receiving specifications against contracts and the Edgar-Thomson mills are assured of fair operating schedules during the month of January. No new contracts in standard rails are reported, but there is considerable tonnage being booked in light rails, which is running at about 2,500 tons weekly. Some spike orders are being placed, but the market is not especially active. We quote standard Bessemer rails as follows, the base price for open-hearth rails being $30, mill:

Fifty-pound and heavier, 500-ton lots and over, $28; carloads and less than 500 tons, $30; less than carload lots, $32; light rails on base weight of 40 to 45 pounds, $28, the schedule on the other weights being irregular and subject to negotiations; angle splice bars for standard sections, 1.50c, Pittsburg; standard spikes, 1.80c to 1.85c, Pittsburg; hand spikes, 1.80c o 1.90c, Pittsburg.

Steel.—The sheet bar market has been reasonably established at $29, makers, mill, or an equivalent Pittsburg price range of from $29 to $30. One buyer has covered for his first quarter needs, about 6,000 tons of Bessemer bars at $29, mill, within the $1, Pittsburg, freight limits, and another has purchased 1,500 tons of spot Bessemer bars at about $29.50, Pittsburg. Some makers are quoting on a Pittsburg basis, others are asking a price at their mills to which the freight to point of destination is added. It is more apparent that while the leading sheet bar makers will not have much free tonnage to offer in the market, they will take care of the needs of their regular customers through contracts, a number of which run for extended periods. Those consumers that have shopped about in times past are the ones most likely to have trouble to get tonnage. Even those buyers who are comfortably covered are watching the market sharply to protect themselves against any possible steel shortage in the future. For some of the tonnage recently placed there have been several applicants among users, and the mills have had little difficulty in obtaining their asking price. Forging billets are still in demand and a small tonnage of regular carbon material at $32, Pittsburg, is noted. Not a great deal of business is being done in rolling steel, but the market is very strong. A sale of 1,000 tons of special carbon open-hearth billets for immediate shipment at about $30, Pittsburg, is noted.

Bessemer 4 x 4 billets with 0.25 carbon and less are quoted at $27.50 to $28, Pittsburg, with the usual extras for size and analysis, and open-hearth rolling billets from $28 to $28.50, Pittsburg. Forging billets are quotable at $31 to $32, Pittsburg. Sheet and tin bars are quoted at $29 to $30, Pittsburg.

Hoops and Bands.—The irregularity of hoop prices which has made the market rather unsatisfactory to makers has disappeared, and it is reported that 1.55c is now the absolute minimum. The market has a better tone throughout, as some of the large users are now appearing as buyers and are placing contracts for their requirements beginning the first of the year. The band trade is very heavy. We quote present prices as follows:

Hoops in carload lots, 1.55c to 1.60c; in less than carload lots, 1.65c to 1.70c; bands, 1.45c to 1.50c, base, with net extras as per standard steel.

Merchant Bars.—Some selling of bars for second quarter requirements generally at 1.50c, Pittsburg, is being done, although this movement is not very heavy as yet, owing to the rather diffident attitude of makers arising from the heavy specified tonnage on their books now awaiting delivery. The volume of new business offered for second quarter is considerable. The specifying movement on last quarter contracts continues to run heavily. It would not be surprising to makers if the ordering activity against contracts would show some slowing up after Jan. 1, as consumers have a large tonnage owing them by the mills which will be delivered on specifications

now entered at intervals through the first quarter. The bar iron situation shows little change with a fair business moving and with makers reluctant to sell beyond the first quarter. Hot and cold pressed nuts have been advanced $2 a ton, and further advances by the first of the year are not unlikely. Bolts are unchanged. The shafting market continues firm. We quote the bar market as follows:

Common iron bars, 1.70c to 1.80c, Pittsburg; Bessemer and open-hearth steel bars, 1.45c to 1.50c; plow and cultivator, 1.45c to 1.50c; channels, angles, zees, tees, under 3-inch, 1.55c to 1.60c, all f. o. b. mill. The following differentials are maintained on steel: Less than 2,000 pounds, 0.15c advance; less than 1,000 pounds of a size, 0.35c advance. Cold rolled and ground shafting, 55 per cent in carloads and 50 per cent in less than carloads, delivered in base territory.

Planished and machine straightened tire is 1.60c base; iron finished tire under 1½ by 1½ inches, 1.55c, both plus net extra on tire card; iron finished tire, 1½ by ½ and over, 1.40c, plus net extra on the steel bar card.

On cold rolled strip steel, width 1½ inches and wider, and 0.100-inch and thicker, we quote base prices for 100 pounds, $3.20 on hard, and $3.45 on soft, except in carload lots of one size where the price is lower.

Structural Material.—The influence of the season is to be seen in structural work as far as new inquiries go, but specifications for plain material to the mills are showing little change from the heavy volume that has been steadily entered. Some fabricators, however, report a fair amount of new work for December coming out. Low prices in finished work are still manifesting themselves in some sections where the shops of sellers are not filled up, so that these interests are lacking aggressiveness for business. The Thompson-Starrett Co. was low bidder on the general contract for the new municipal building in New York, which will require 26,500 tons of steel. The long proposed bridge across the Ohio river at Parkersburg, W. Va., which has met with various obstacles, is now showing more likelihood of being carried forward. The necessary legislation to permit its erection has lately been introduced in Congress. Approximately 3,000 tons of steel will be required for this work. The new Huntington & Northern railroad bridge at Huntington, W. Va., which is expected to be in the market soon, will require several thousand tons. A new hospital building for Indianapolis requiring about 2,200 tons is up for bids. Other prospective contracts are those for about 1,000 tons for the new open-hearth steel plant of the Basic Steel Co., at Niles, O., and about 300 tons for new buildings at the Allegheny County Home. Bids have not yet been asked on the 4,500 tons for the new open-hearth plant of the American Rolling Mill Co., at Middletown, O., but are expected soon. The McClintic-Marshall Construction Co. has taken 200 tons for an addition to the plant of the Westinghouse Airbrake Co. The Carnegie Steel Co. will furnish the 6,500 tons of plain material to the McClintic-Marshall Construction Co. for the new open-hearth buildings of the Republic Iron & Steel Co., at Lansingville, O. We quote present shape prices as follows:

Beams and channels, 15-inch and under, 1.55c to 1.60c; over 15 inches, 1.65c to 1.70c; zees, 1.55c to 1.60c; tees, 1.55c to 1.60c; angles, from 3 to 6 inches, 1.55c to 1.60c; over 6 inches, 1.55c to 1.70c; universal and sheared plates, 6¼ inches wide and wider, 1.55c to 1.60c.

Merchant Pipe.—The National Tube Co. has adopted a re-classification of merchant pipe which corrects some of the present inequalities in the schedule, and a new card will be announced to the trade next week to be effective Jan. 1. By reason of the revision some price changes will be necessitated, but these will not be of uniform extent.

The usual diminished volume of merchant pipe specifications from jobbers at the year's end due principally to inventory taking is to be noted, although there is a fair tonnage coming to the mills. New business is not heavy. Selling into next year is now going ahead, but makers are not disposed to cover jobbers' needs for more than 30 days in advance. The quiet season in pipe line work is at hand, but numerous projects are under consideration. A recent export order taken which will be rolled by the mills in this territory calls for 1,000 tons of drive pipe for shipment to India. Another export order of importance upon which shipments have about been completed consists of 80 miles of 8-inch and 60 miles of 6-inch to Persia. Prices are unchanged and we quote the following official discounts on merchant pipe in carloads subject to the usual additional discounts to the largest buyers:

	—Steel—		—Iron—	
	Black.	Galv.	Black.	Galv.
⅛ and ¼ inch.....	71	55	65	..
⅜ inch	72	58	66	32
½ inch	75	63	69	57
¾ to 6 inch	79	69	73	63
7 to 12 inch	74	59	68	51
PLUGGED AND REAMED.				
1 to 4 inch	77	67	71	61
EXTRA STRONG PLAIN ENDS.				
⅛ to ⅜ inch.....	64	52	58	46
½ to 4 inch	71	59	65	53
4½ to 8 inch	67	55	61	49
DOUBLE EXTRA STRONG PLAIN ENDS.				
½ to 8 inch	60	49	54	43

Boiler Tubes.—Some contracting for their first half requirements by the merchant trade in boiler tubes is reported and the market continues to show improvement. There is some locomotive business going. The seasonable quietness is having its effect on orders entered against contracts, but some of the makers are very comfortably filled with specifications. We quote the following official discounts on boiler tubes to the large buyers:

	Steel.
1 to 1½ inch.....	49
1¾ to 2¼ inch.....	61
2½ inch	63
2¾ to 5 inch	69
6 to 13 inch	60

2½ inch and smaller, over 18 feet, 10 per cent net extra.

2¾ inch and larger, over 22 feet, 10 per cent net extra.

To destinations east of the Mississippi river will be sold at delivered discount for carloads lowered by two points, for lengths 22 feet and under; longer lengths, f. o. b. Pittsburg.

	Iron.
1 to 1½ inch	43
1¾ to 2¼ inch.....	43
2½ inch	48
2¾ to 5 inch.....	55
6 to 13 inch.....	43

Wire Products.—The recent advance in the wire market has produced no noticeable effects and the wire and nail jobbing trade continues very light because of the off season. Some nice business, however, is being booked in manufacturing wire for first half. Prospects in the wire market for first half are pronounced as excellent by leading makers. Manufacturers of wire fencing are especially gratified with the outlook. Price talk is strong and further advances soon would not be surprising. We have revised our prices and quote as follows, contracts with the jobbing trade being limited usually to 60 days:

Wire nails, jobbers' carload lots, $1.85; retailers' carload lots, $1.90; painted barb wire, jobbers' carload lots, $1.85; retailers' carload lots, $1.90; with 30c for galvanizing; plain wire to jobbers in carloads, $1.65, and to dealers in carloads, $1.70; polished staples, $1.85; galvanized staples, $2.15.

Wire Rods.—Recent sales of Bessemer rods in this territory at $33, Pittsburg, are noted. Makers are not anxious to sell rods on account of their own steel needs, and quotations are largely nominal at $33 and $34, Pittsburg, on Bessemer and open-hearth rods.

Coke.—Determined efforts are being made by prospective furnace buyers to shade the prices of standard Connellsville coke asked by the operators, and the situation has resolved itself into a deadlock between the interested parties. The operators, while admitting there is an easier tone to conditions in line with that of the iron and steel industry as a whole at the year-end, insist there is no genuine weakness in the reliable brands, and that the minimum on contracts for standard coke is $2.75, ovens. Some of the buyers now in the market with inquiries claim their ability to obtain lower prices. Despite the conflicting reports the forward market on our best grades remains

reasonably firm. There has been some speculative buying of furnace coke in anticipation of an active demand in December, and this tonnage is likely having some effect upon the spot market, although the prompt situation is showing some range in prices according to the urgency of the needs of the particular buyer. Spot sales are reported this week up to $2.90, ovens. A contract for furnace coke closed this week calls for about 5,000 tons monthly for first half, the price to be fixed by a sliding scale based upon the pig iron market. Consumers of foundry coke are specifying liberally on contracts, but new business is light. The car and labor situation in the Connellsville regions is improved this week, but the shortage of water is still causing some annoyance. We quote standard furnace Connellsville coke for prompt shipment at $2.75 to $2.80, ovens, and on contract from $2.75 to $2.80, ovens. On first grade Connellsville foundry coke we quote from $3.10 to $3.25, ovens, for prompt, and $3.25 to $3.50, ovens, on contract. The *Courier's* figures for the week ending Dec. 11 show 35,412 ovens active with an output of 438,765 tons, compared with 35,338 active ovens and a production of 444,610 tons the previous week.

Old Material.—The scrap market is easy throughout owing to the lack of buying support from consumers who are showing little interest in prices while engaged in the usual work of winding up the year. Quotations in some grades are largely nominal, but in others there is a slightly weaker tone. Cast scrap appears to be one of those grades which are suffering from the inactive conditions and buyers are bearish upon it owing to the dull pig iron market. Consumers of heavy steel are declining to pay more than $18, delivered, and this market is also somewhat easier. There is a greater effort being made to move scrap from yards to consuming points before the beginning of heavy snowfalls. We quote, gross tons, delivered in the Pittsburg district, including Brackenridge, Follonsbee, Sharon, Monessen and Steubenville, as follows:

Heavy melting scrap	$18.00 to 18.25
Rerolling rails	18.50 to 19.00
Bundled sheet scrap	15.50 to 16.00
Iron axles	27.00 to 27.50
Old iron rails	19.50 to 20.00
No. 1 wrought scrap	19.00 to 19.25
Old car wheels	17.00 to 17.50
Low phosphorus	22.00 to 22.50
Machine shop turnings	13.00 to 13.50
Cast borings	10 75 to 11.25
No. 1 cast scrap	16.50 to 17.00
Malleable	17.00 to 17.50
Stove plate	14.00 to 14.50

CHICAGO.

Southern Pig Iron Weaker — Some Good Sized Structural Contracts.

Office of THE IRON TRADE REVIEW,
1328 Monadnock Block, Dec. 21.

As the last 10 days of the old year are entered upon, the spirit of the season seems at last to have taken possession of business in the iron and steel trade, and it is temporarily relegated to a secondary position in the thoughts of men. Christmas shopping now reigns supreme, and so far as local conditions are concerned, this year is proving the heaviest in that respect on record. Apparently, no serious effort is being made, in iron and steel circles in this city, to do business, and it is generally conceded that no important change will occur, nor any degree of activity ensue, before the middle of January, or possibly a week or two later. There is observed, this week, the same sharp contrast between the conditions prevailing in the pig iron market and those uppermost in the finished steel lines; in the one, there is a very listless feeling, amounting to weakness, and in the other, much strength and a continuation of specifying on old contracts to an extent much in excess of mill capacity. On the earlier contracts, made at prices much below the present levels, practically everything is cleaned up, or will be, within the next few days, for no extension of time will be granted, and the contract which has not been specified against, will die a natural death on Dec. 31, with no mourners among the parties of the first part. There is a remarkable unanimity of opinion, amounting to conviction, on the prospects which 1910 holds in store for the steel business. Universally, there is expectation of a steadily increasing business, and nothing can be discerned in the future which will interfere with the realization of this expectation, unless, possibly, there may arise disputes between employers and employes over the question of wages. The increasing cost of living naturally produces a feeling of uneasiness in the minds of men whose surplus and sinking funds are inconspicuous. At the present time, there is nothing in the local situation which threatens any disturbance. Furnaces and mills are being operated to full capacity. The 18-inch mill at Gary, which was given its initial run on Dec. 16, has been gradually smoothing out the difficulties incident to the starting up of a new mill, and soon will be operating at full capacity. It is the intention to run this mill on tie plates, as the Corporation has a very heavy tonnage on its books. Near this mill, a small auxiliary shop has been erected, which will be equipped with shears and punches, and in which the tie plates will be finished, as they come from the 18-inch mill. It is understood that negotiations are under way for the location, at Gary, of a plant for the manufacture of bolts and screws, by the Pittsburg Bolt & Screw Co. If this deal should be successfully concluded, it probably will be the first plant to be erected in the new steel town, outside of the Steel Corporation and its auxiliaries, although a number of others have secured sites for future location there.

The contract for the steel for the south side baseball park finally has been let, George W. Jackson, Inc., being the successful bidder. Nearly 1,000 tons will be required. The contract for the Boston Store addition also has been let, the steel amounting to 4,000 tons, going to the South Halsted Street Iron Works.

Pig Iron.—Southern foundry iron undoubtedly has lost ground the past week in the Chicago market. Persistent pressure has resulted in establishing the $14.50, Birmingham, quotation as the top price for No. 2 foundry, although one of the leading producers of the south still holds to its price of $15, which, of course, under the circumstances, is a virtual withdrawal from the market. As this report closes it develops that some dealers have iron which they are willing to sell at $14, Birmingham, and will extend delivery to include the second quarter of 1910. Reports which cannot be entirely ignored, are to the effect that a few cars of southern iron—presumably standard foundry—have been sold in this market at $18, flat, or on a basis of $13.65, Birmingham. It is understood that this small lot was consignment iron, on which some money had been advanced by northern factors. Notwithstanding these adverse influences, pig iron men are not discouraged, and are willing to wait a few weeks for the improvement which they confidently expect will take place when the iron which is now pressing on the market has been disposed of. They stake their faith on the presumption, which seems reasonable, that the market at present is simply going through a shaking-out process, and that when the weak holders have sold themselves out of the market, there will be a reaction, and values will be a great deal firmer, and be established on a higher basis

than they now occupy. It is not at all improbable that the present "slump," if so it may be called, will inaugurate a buying movement which will have the inevitable effect of bringing prices back to the $15 mark, if not to higher figures. Even in the present situation, there is a little promise of this coming to pass. A better inquiry is reported by some dealers the past week, and some interest is being manifested by occasional melters in the question of prices for the third quarter, and for the entire year. This indicates that there are a few, at least, who have sufficient business in sight to justify them in lining up on prices long enough in advance to protect them against possible loss. Some inquiry is reported from malleable foundries, one for 1,000, and another for 2,000 tons being mentioned. The malleable foundries may be expected to develop a strong interest in the market, as the continued cold weather has improved their chances for securing the much-needed labor, which has been scarce while outside work was so plentiful. Production among the malleable foundries was seriously curtailed, and it is not unreasonable to expect that, with more labor available, increased output will be possible, which will have its immediate effect on the pig iron situation. To some extent, this may be said to apply also to the gray iron foundries. On the threshhold of the new year the prediction is herewith set forth, that there will be a buying movement of good proportions within a very short time from the turning of the hour glass for 1910, and that better prices and better general conditions will rule, immediately thereafter.

Lake Superior charcoal	$20.00 to 20.50
Northern foundry No. 2	19.00 to 19.50
Southern foundry No. 2	18.35 to 18.85
Southern silveries, 5 per cent silicon	19.90 to 20.40
Jackson Co. silveries, 8 per cent	21.40
Malleable Bessemer	19.00 to 19.50
Alabama basic	19.35 to 19.85

Billets.—This form of steel continues very scarce, as has been previously noted in these reports. Consumers are finding it more difficult to secure supplies, as is shown by the large number of inquiries which steel makers are compelled to turn down almost every day.

Merchant Bars.—The market is very strong, as it has been for many weeks. Mills are sold up for months ahead, some for longer periods than others, but four or five months is not an extreme situation to cite in describing the prosperous condition of the bar iron market. Local warehouses are having a very heavy demand made upon them, and in the past few days the automobile makers have been prominent in the buying of cold-rolled material, such as screw stock.

We quote, for Chicago delivery, as follows, with prevailing extras:

Bar iron, 1.60c to 1.65c; hard steel bars, re-rolled, 1.60c to 1.65c; soft steel bars and bands and small shapes, 1.68c to 1.78c base; hoops, 1.78c to 1.88c; planished or smooth finished tire steel, 1.88c to 1.93c; iron finish, up to 1½ x ½ inch, 1.83c base, tire card; iron finish, 1½ x ½ inch and larger, 1.68c, base, bar card; channel for solid rubber tires, ¾ to 1 inch, 2.18c, flat, and 1⅛ inches and larger, 2.08c, flat; smooth finished machinery steel, 1 inch and larger, 2.43c; flat sleigh shoe, 1.73c; toe calk steel, 2.23c; spring steel, 2.28c; crucible spring steel, 2.78c; tool steel, 7c to 9c, with higher prices for special grades. Quotations on shafting are 55 per cent off the list for carload lots, and 50 per cent off for less than carload lots, carload freight allowed to points in base territory.

On iron and steel bars from local stocks, we quote, as follows: Bar iron, 2c to 2.10c, base; soft steel bars, 1.90c to 2c per 100 pounds, base; soft steel hoops, 2.40c to 2.50c, full extras.

Plates.—There is no let-up in the activity of the mills, and the amount of new business, in addition to specifications, is very heavy, especially for structural plates. Many orders are being refused because of the impossibility of getting them executed within the required time. Just where this overflow business is going is not apparent, but in all probability the eastern mills are the beneficiaries.

We quote, Chicago delivery, as follows: Tank plates, ¼ inch thick, 6¼ to 100 inches, 1.78c to 1.88c. For extras see Pittsburg report.

Store quotations are without change as follows: Tank steel, ¼ inch and heavier up to 72 inches wide, 2c to 2.10c; from 72 inches to 96 inches wide, 2.10c to 2.20c; 3/16 inch up to and including 60 inches wide, 2.10c to 2.20c; 72 inches, 2.35c to 2.45c; No. 8 up to 60 inches wide, 2.15c to 2.25c. Flange and head quality, 25c extra.

Sheets.—The sheet market is very firm, and makers are in a very comfortable position as to the future, having sold as far ahead as July 1. Unsolicited business coming in at the present time amounts to a very considerable tonnage. There also is a very heavy demand for sheets out of store. Sheet bars are reported very firm in the east, and as an instance of this, it is reported that a recent sale of 5,000 tons was made, at a price of $30, Pittsburg.

For mill prices see Pittsburg report. Freight to Chicago, 18 cents.

We quote store prices at Chicago as follows: No. 10, 2.25c to 2.35c; No. 12, 2.30s to 2.40c; No. 14, 2.35c to 2.45c; No. 16, 2.45c to 2.55c; Nos. 18-20, 2.80c to 2.90c; Nos. 22-24, 2.85c to 2.95c; No. 26, 2.90c to 3.00c; No. 27, 2.95c to 3.05c; No. 28, 3.00c to 3.10c; No. 30, 3.30c, galvanized sheets, Nos 10 and 16, 3.20 to 3.30c; Nos. 18 and 20, 3.35c to 3.45c; Nos. 22 to 24, 3.50c to 3.60c; No. 26, 3.50c to 3.80c; No. 27, 3.90c to 4.00c; No. 28, 4.10c to 4.20c; No. 30, 4.50c to 4.60c.

Wire Products.—This market is reported in an unchanged condition, the volume of business constantly coming in being well up to reasonable expectations, considering the near approach of the first of the new year.

We quote, Chicago delivery, for the remainder of this year, as follows:

Wire nails, jobbers' carload lots, $2.03; retailers' carload lots, $2.08; retailers' less than carload lots, $2.18; painted barb wire, jobbers' carload lots, $2.03; retailers' carload lots, $2.08; retailers less than carload lots, $2.18; with 30c for galvanizing; plain wire to jobbers, carload lots, $1.83; staples, bright, $2.03.

Structural Material.—The capacity of the mills is still below the tonnage which is being entered on the books of the fabricating companies and as yet no relief from the congested conditions is apparent. So urgent are some of the buyers of structural material, that they have specified stock from warehouses, which, of course, very materially adds to the cost of the undertaking. A local building project has been closed by the letting of the contract for the steel to the American Bridge Co. The building is that of the Chicago Title & Trust Co., and requires 538 tons. The same fabricating company has secured the contract for a second bag house for the Mammoth Smelter Co., at Kenneth, Nev., which will require 500 tons.

We quote mill prices for structural shapes, Chicago delivery, as follows:

Beams and channels, 15-inch and under, 1.78c to 1.88c. For extras see Pittsburg report.

Local store prices are as follows: All angles, 3 inches and larger, including 6 inches, $2 to $2.10 per 100 pounds; angles over 6 inches, $2.10 to $2.20 per 100 pounds base; beams, 3 to 15 inches, inclusive, $2 per 100 pounds base; channels, 3 inches and larger, $2 per 100 pounds base.

Merchant Pipe and Tubes.—There has been some little easing off in the degree of activity in the pipe and tube

business, as jobbers have been letting their stocks dwindle, in anticipation of inventory taking. Otherwise, the conditions are wholly unchanged.

For mill discounts, see Pittsburg report.

We quote, out of store, as follows: Wrought steel pipe, black, ⅛-inch to ¼-inch, 68 per cent; ⅜-inch, 69 per cent; ½-inch, 72 per cent; ¾-inch to 6-inch, 76 per cent; 7-inch to 12-inch 71 per cent. Iron pipe about 6 points higher.

Lap-welded steel tubes, 2¾-inch to 5-inch, 60 to 62 per cent; charcoal iron tubes, 2¾-inch to 4-inch, 48 to 50 per cent; seamless steel tubes, 2¾-inch to 4-inch, 47½ per cent.

Cast Iron Pipe.—At the opening of the bids for 2,000 tons of pipe at Minneapolis, it was found that a Sheffield, Ala., interest was the lowest bidder. The contract has not yet been let, however. The trade, as a whole, is very quiet.

We quote as follows: 4-inch water pipe, $28.50; 6 to 16 inches, $27.50; larger sizes, $26.50; gas pipe, $1.00 a ton higher.

Rails and Track Supplies.—The local interest booked sales of 21,000 tons of standard rails during the past week, most of which were Bessemer. New tonnage of track fastenings for the week has been very good. Light rails are in moderate request.

See Pittsburg report for prices on standard sections.

On light rails, Chicago delivery, we quote as follows: Light rails, 40 and 45-pound, $26.30 and 35-pound, $26.75, 16, 20 and 25-pound, $27; 12-pound, $28. In lots of 250 to 500 tons a reduction of 60c a ton from these prices is made; lots of 500 tons and up carry a reduction of $1 a ton. Track supplies, f. o. b. Joliet, angle bars, 1.50c to 1.60c; railroad spikes, 1.80c to 1.90c; smaller size spikes, 1.85c to 1.90c, base; track bolts with square nuts, 2.30c to 2.55c, base; with hexagon nuts, 2.45c to 2.70c.

Old Material.—Quietness is the most noticeable feature of the scrap market at present, and everything connected with it seems at a standstill. Prices are hoding, nominally, at former quotations. We quote, gross tons, as follows:

Old car wheels	$17.75 to 18.25
Old iron rails	19.50 to 20.50
Rerolling rails (4 ft. and over)	17.75 to 18.25
Old steel rails (2 ft. and under)	17.00 to 17.50
Light section relayers, 45 lbs. and under subject to inspection	21.00 to 23.00
Relaying rails, subject to inspection	24.50 to 25.00
Frogs, switches and guards	15.50 to 16.00
Heavy melting steel	15.50 to 16.00
Shoveling steel	15.00 to 15.50

We quote, net tons, as follows:

No. 1 R. R. wrought	$14.50 to 15.00
No. 2 R. R. wrought	13.50 to 14.00
Arch bars and transoms	17.75 to 18.25
Knuckles, couplers and springs	14.25 to 14.75
Shafting	17.50 to 18.00
Iron car axles	21.25 to 21.75
Steel car axles	20.50 to 21.00
Locomotive tires	18.00 to 18.50
Dealers' forge	12.00 to 12.50
Pipes and flues	11.50 to 12.00
No. 1 cast, 150 lbs. and less	14.25 to 14.75
No. 1 busheling	13.00 to 13.50
No. 2 busheling	9.75 to 10.25
No. 1 boiler cut	11.25 to 11.75
Boiler punchings	16.00 to 16.50
Cast and mixed borings	7.00 to 7.50
Machine shop turnings	10.50 to 11.00
Railroad malleable	14.25 to 14.75
Agricultural malleable	12.75 to 13.25
Stove plate and light cast scrap	12.25 to 12.75
Angle bars, splices, etc. (iron)	17.25 to 17.75
Angle bars, steel	15.50 to 16.00

CLEVELAND.

Advance of Fifty Cents on Bessemer Ores—Price of Non-Bessemer Not Fixed.

Office of THE IRON TRADE REVIEW,
Browning Building, Dec. 21.

Iron Ore.—It is now definitely settled that there will be an advance of 50 cents per ton on Bessemer ores, making the quotation on old range Bessemer $5, and on Mesabi Bessemer, $4.75; in fact, some sales have already been made at these figures. Concerning non-Bessemer ores, there is still uncertainty, and opinions of ore men as to what prices will be show considerable variance. It is expected that a decision in regard to non-Bessemer ore prices will not be reached until after Jan. 1, but the users of these ores are showing more interest and it may be that some mining companies will make sales which will fix the prices. It is also definitely determined that there will be no change in the guarantee of iron content, which will remain at 55 per cent on old range and Mesabi Bessemer, and 51½ per cent on old range and Mesabi non-Bessemer. Reservations of considerable tonnages of non-Bessemer ore have been made.

On base ores with the guarantee of 55 per cent on old range and Mesabi Bessemer, and 51½ per cent on old range and Mesabi non-Bessemer, we quote as follows: Old range Bessemer, $5; Mesabi Bessemer, $4.75; old range non-Bessemer, $3.70; Mesabi non-Bessemer, $3.50, although, as stated above, prices for next season's non-Bessemer ores have not been fixed.

Pig Iron.—The leading cast iron pipe interest has purchased 2,000 tons of No. 3 and No. 4 foundry pig iron for delivery the first quarter of next year, and the leading harvester interest is also in the market for a moderate tonnage for its Akron plant. While buying is by no means brisk and inquiries are not numerous, there are indications that a good buying movement can be expected after the first of the year. The outlook for malleable seems to be especially good. Just at present, however, prices are somewhat lower on foundry grades. A valley interest which sometime ago was very aggressive in making low prices, has again entered the market, and is offering to sell No. 2 foundry at $17, valley. Other more conservative interests in Cleveland and elsewhere are meeting this quotation when necessary. Although until within a few days the quotation for No. 2 foundry delivered in Cleveland for either prompt or first half was $18.25, a sale of 500 tons was made a few days ago at $18, delivered, and this quotation could probably be shaded if the furnaces found it necessary in order to meet outside competition. A Cleveland interest which has been in the market for 2,500 tons of Bessemer, has endeavored to shade $19, valley, but has not succeeded in doing so. There is some inquiry for basic from brokers, but it is not receiving serious attention.

No. 1 foundry	**$ 18.75**
No. 2 foundry	$17.90 to 18.00
No. 3 foundry	**17.75**
No. 2 Southern	18.35
Gray forge	17.15 to 17.40
Bessemer	19.90
Lake Superior charcoal	19.50 to 20.00
Jackson Co. 8 per cent silvery	20.55

Coke.—There are some indications of soft spots in the coke market, but for the most part quotations are pretty well maintained. For prompt delivery, Connellsville furnace is quoted at $2.65 to $2.75, and the usual contract price is $2.80. In foundry coke, we quote $3.10 to $3.25 for prompt and $3.25 to $3.50 for first half.

Finished Material.—While some interests report a decrease in specifications, others say that specifications continue as heavy as at any time during the month, and the general outlook in finished lines is excellent. Consumers of steel bars are endeavoring to contract and will probably be able to do so for first quarter at 1.50c. This quotation might be shaded for very desirable tonnages. Some additional contracts for lake freighters are being figured on, but nothing definite has been determined. Eastern manufacturers of plates are still able to sell at 1.79c, Cleveland, for prompt shipment. Bar iron prices prevailing in the city are about as they have been, but on shipments to distant points where freight rates are heavy, the net price at Cleveland mills is rather low. Jobbers are getting from 1.90c to 2c on both iron and steel bars out of store, and 2c to 2.10c on plates and shapes.

Old Material.—The local market continues in a state of lassitude, any

buying that has taken place being insignificant in its bearing on the situation. Nominal prices, gross tons, f. o. b. Cleveland, are as follows:

Old iron rails	$20.00 to 20.50
Old steel rails (under 6 feet)	17.50 to 18.00
Old car wheels	17.50 to 18.00
Old steel boiler plate	14.00 to 14.50
Malleable iron (railroad)	17.00 to 17.50
Steel axles	19.50 to 20.00
Malleable iron (agricultural)	15.00 to 15.50
Heavy steel	16.25 to 16.75
Country mixed steel	14.00 to 14.50

We quote, net tons, as follows:

No. 1 R. R. wrought	$16.00 to 16.50
No. 1 busheling	14.00 to 14.25
No. 1 machine cast	15.00 to 15.50
Axle turnings	11.00 to 11.50
Machine shop turnings	10.50 to 11.00
Grate bars	12.50 to 13.00
Pipes and flues	12.00 to 12.50
Tank iron	11.50 to 12.00
Sheet iron	6.50 to 7.00
Wrought drilling	10.50 to 11.00
Stove plate	12.00 to 12.50
Cast borings	8.50 to 9.00

CINCINNATI.

Pig Iron Market Quiet, With Rumors of Lower Prices.

Office of THE IRON TRADE REVIEW,
First National Bank Building, Dec. 21.

Pig Iron.—The market rules quiet and easy in tone. Southern iron is now obtainable at $14, Birmingham, for first half of 1910, and northern No. 2 foundry and malleable are quoted at $17, Ironton, for the first half of next year. There is some scattered inquiry, but the melters inquiring for iron are generally located in territory where northern iron can be purchased to advantage from a nearby furnace. A Michigan melter is in the market for 2,000 tons of malleable for first half delivery and another northern melter is inquiring for 3,000 tons of foundry iron for second quarter delivery. There is one inquiry for 1,000 tons of No. 2 foundry for last half delivery. A central Ohio consumer is asking prices on 1,000 tons of foundry iron for second and third quarter delivery. There is but little interest in prompt shipment of either northern or southern iron. In some instances, consumers are claiming to have been quoted less than $17, furnace, on northern iron and below $14, Birmingham, on southern, but these rumors are not confirmed. The trade generally agrees that but little can be expected in the way of active demand until after the holidays and some well-informed observers expect considerable shopping in January for second quarter delivery. There seems to be continued good consumption and a number of last half contracts have been completed. First quarter deliveries will be on contracts at prices ranging from $13.50 to $14.50, Birmingham, for southern iron, and from $15.50 to $16.50 on northern iron. It is intimated that in some instances consumers having iron due them on contracts at higher prices than the spot market may be inclined to hold up shipments. The northern iron market at $17 at furnace as against the southern price of $14, Birmingham, is out of line, as a spread of $3 per ton is too great. It may be said, however, that the northern furnaces are in better position to maintain prices than the southern producers, as they have a large tonnage on books for delivery in the first half of 1910. We quote for prompt delivery and for the first quarter of 1910, delivered Cincinnati, based on freight rates of $3.25 from Birmingham and $1.20 from Ironton, as follows:

Southern foundry No. 1	$17.75 to 18.25
Southern foundry No. 2	17.25 to 17.75
Southern foundry No. 3	16.75 to 17.25
Southern foundry No. 4	16.75 to 17.00
Southern No. 1 soft	17.75 to 18.25
Southern No. 2 soft	17.25 to 17.75
Southern gray forge	16.75 to 17.00
Northern No. 1 foundry	18.70
Northern No. 2 foundry	18.20
Northern No. 3 foundry	17.70
Jackson county 6 per cent silicon	19.20
Jackson county 8 per cent silison	20.20
Jackson county 10 per cent silicon	21.20

Finished Material.—The feature of the market was the heavy specifying during December for tonnage due on contracts which expired Jan. 1. Jobbers are still enjoying an active demand and finding it difficult to keep stocks up owing to the slow mill deliveries. Prices for carload lots are based on Pittsburg quotations.

Coke.—The market is generally quiet, although there is some little call for prompt shipment furnace and foundry coke to be used as a reserve against probable difficulty in securing December shipments on contracts. Prices have made no material change and quotations in the leading coke producing districts are as follows:

	Prompt shipment.	First half 1910.
Connellsville district:		
Foundry coke	$3.10 to 3.35	$3.35 to 3.50
Furnace coke	2.75 to 2.80	2.75 to 3.00
Wise county district:		
Foundry coke	2.75 to 3.00	3.00 to 3.50
Furnace coke	2.00 to 2.25	*Sliding [scale basis.
Pocahontas district:		
Foundry coke	3.00 to 3.10	3.00 to 3.25
Furnace coke	2.65 to 2.75	2.75

***Sliding scale basis means $1.60 for coke based on $9, Birmingham, for pig iron, with an advance of 16⅔ per cent of the amount over $9 at which pig iron is quoted. This is the usual basis. Other forms of sliding contracts are also made.**

Old Material.—Aside from some call for heavy melting steel, the market is rather lifeless and not materially changed. Current quotations could probably be shaded for moderate tonnages, but as a rule dealers are not attempting to market their holdings, preferring to wait for the demand to improve, recognizing a liberal consumption as favoring this course. Dealers' prices to consumers are as follows:

Old No. 1 R. R. wrought, net tons	$13.50 to 14.00
No. 1 machinery, net tons	13.50 to 14.00
No. 1 busheling, net tons	13.00 to 13.50
Old iron rails, gross tons	18.00 to 18.50
Old steel rails (re-rolling), gross tons	17.00 to 17.50
Old short lengths, gross tons	15.50 to 16.50
Old iron axles, net tons	19.00 to 19.50
Heavy melting scrap, gross tons	14.50 to 15.00
Stove plate, net tons	10.50 to 11.00
Heavy turnings, net	9.25 to 9.75
Cast borings, net tons	8.00 to 8.50
Car wheels	15.50 to 16.00
Grate bars	12.00 to 12.50

BUFFALO.

Good Demand for Basic and Prices Firm—Market is Quiet.

Office of THE IRON TRADE REVIEW,
932 Ellicott Square, Dec. 21.

Pig Iron.—The market at this point is in a quiet condition and is likely to remain so until the beginning of the new year. The usual holiday quiet has fallen upon the iron market and with the coming on of inventories it is likely that a quiet market will prevail for the next two weeks.

The general quotations on foundry iron remain about the same as last reported and a fair call for the foundry grades is felt. There are some indications of strength for the early part of 1910. Basic is selling at $18 to $18.50 at furnace and the demand in this territory for this grade of iron at the present time is crowding the supply very hard. The quotations on basic offered herewith and covering the first quarter of 1910 show a strong tone, $18.25 to $18.75 being the price asked at furnace for deliveries during that period. It should be born in mind by the buyers that all foundry iron cannot be had as low as prices quoted, for in numerous instances a much higher price is obtained. One interest recently sold 700 tons No. 2X foundry for $17.50 at furnace, deliveries within the next four months, and another $18.50 at furnace. This shipment will go into New England. Some good prices have also been obtained for special analysis iron and sales of this character are reported by all interests at this point. The output of the furnaces is heavy; the cold weather of the past week having stimulated the production at the furnaces.

Tonnage is being shipped out in larger quantities than usual and some records in this respect are being broken. The condition at the foundries and iron works is very satisfactory and the consumption in this territory shows a nice increase. The call from central New York has shown an improvement.

We quote for deliveries during first

quarter of 1910, f. o. b. Buffalo, as follows:

No. 1X foundry	$17.25 to 17.75
No. 2X foundry	16.75 to 17.25
No. 2 plain	16.75 to 17.00
No. 3 foundry	16.25 to 16.50
Gray forge	16.00 to 16.50
Malleable Bessemer	17.25 to 18.25
Basic	18.25 to 18.75
Charcoal	20.00 to 21.00

Finished Products.—The market opened very quietly today, marking a sharp falling off in specifications, probably due almost entirely to the holiday season. Bids were opened today for the steel work on the Statler hotel addition involving about 500 tons of structural. The bidders were numerous. The Buffalo Structural Steel Co. was the lowest bidder, its figures being about $22,000. There are not many important transactions up at present and, unless some new specifications of a substantial character appear, the market will be quiet for some little time. The interests, however, are heavily oversold, as previously reported. It is estimated that the Lackawanna Steel Co. is practically covered for the first half of 1910.

Old Material.—There is very little selling of scrap iron at Buffalo and the dealers all have heavy tonnage in which there has been no movement for many weeks. They are not inclined to sell at shaded prices and yet it is not desirable to carry over this stock for any great length of time. The scrap situation here is not a very encouraging one and many of the heaviest consumers seem to have covered their needs for several months. The Lackawanna Steel Co. is by far the biggest consumer of scrap in this market, but from present indications it is likely to be out of the market for some weeks. The quotations we offer are merely nominal, but would fairly represent the asking price of the various materials mentioned. The inquiries coming into this market are so light at this time that it is difficult to offer tangible quotations.

We quote, gross tons, f. o. b. Buffalo, as follows:

Heavy melting steel	$16.50 to 17.00
No. 1 railroad wrought scrap	18.25 to 18.75
No. 1 railroad and machine cast scrap	16.50 to 17.00
Old steel axles	21.00 to 21.50
Iron axles	26.00 to 26.50
Car wheels	19.00 to 19.50
Railroad malleable scrap	17.00 to 17.50
Machine shop turnings	12.00 to 12.50
Cast iron borings	9.50 to 10.00
Low phosphorus steel scrap	21.00 to 22.00
Old iron rails	20.00 to 21.00
Tank iron	14.00 to 14.50
Sheet iron	9.00 to 9.50
Stove plate	14.00 to 14.50
Pipe and flues	14.00 to 14.50
Grate bars	13.00 to 13.50
Boiler plate	15.50 to 16.00
Iron car axles	20.00 to 21.00
Steel car axles	20.00 to 21.00
Locomotive tires	18.00 to 18.50
No. 1 country wrought	12.25 to 12.75
Pipes and flues	11.75 to 12.00
No. 1 cast, 150 lbs. and less	14.00 to 14.50
No. 1 busheling	13.00 to 13.50
No. 2 busheling	9.75 to 10.25
No. 1 boiler cut	11.50 to 12.00
Boiler purchings	13.00 to 14.00
Cast and mixed borings	7.50 to 8.00
Machine shop turnings	10.75 to 11.25
Railroad malleable	13.25 to 13.75
Agricultural malleable	11.50 to 12.00
Stove plate and light cast scrap	11.50 to 12.50
Angle bars, splices, etc. (iron)	17.25 to 17.75
Angle bars, steel	15.50 to 16.00

The Continental Can Co., Trenton, N. J., has increased its capital stock from $1,000,000 to $3,000,000.

ST. LOUIS.

Little Active Business in Pig Iron—Coke Inquiry Withdrawn.

Dec. 21.

Pig Iron.—With the exception of one order for 500 tons of car wheel iron and several other for car load lots, there was very little business transacted in the St. Louis territory last week. The mails were conspicuously free from orders and inquiries this morning, and dealers are not expecting things to brighten up until after the holidays. Although some interests are quoting nominally higher prices, $14 for No. 2, Birmingham, is the prevailing price for either prompt or first quarter delivery. Southern Ohio foundry iron is quoted at $17, Ironton. Our quotations on southern iron, delivered, to which the Birmingham freight of $3.75 has been added, follow:

No. 1 foundry	$ 18.75
No. 2 foundry	18.25
No. 3 foundry	17.75
No. 4 southern	16.75 to 17.25

Coke.—The inquiry for 20,000 tons reported to have reached the St. Louis territory last week, for use in Texas, has disappeared. It is now said that the furnace making the inquiry will not be run for some time. Quotations on Connellsville 72-hour foundry coke for immediate shipment range from $3 to $3.25, ovens, according to the quality, and $3.15 to $3.50 for future delivery. Connellsville 48-hour furnace coke is firm at $2.75 to $3, ovens, for immediate and future shipment. Virginia 72-hour foundry coke is held at $3. to $3.35 for shipment at once or on contracts; Virginia 48-hour furnace grades at $2.50 to $2.75.

The freight on coke to East St. Louis and St. Louis is $2.80, and $2.70 from the Virginia fields when shipment is destined beyond St. Louis.

Old Material.—The scrap iron market is by no means active, but there is no indication of demoralization, and dealers believe there will be a general picking up of the market after Jan. 1. Our quotations on scrap iron follow:

We quote, net tons, as follows:

Old car wheels	$17.00 to 17.50
Old iron rails	19.00 to 20.00
Rerolling rails (4 ft. and over)	16.75 to 17.25
Old steel rails (2 ft. and under)	16.50 to 17.00
Light section relayers, 45 lbs. and under, subject to inspection	21.00 to 23.00
Relaying rails, subject to inspection	24.50 to 25.00
Frogs, switches and guards	15.50 to 16.00
Heavy melting steel	15.50 to 16.00
Shoveling steel	14.00 to 14.50

We quote, net tons, as follows:

No. 1 R. R. wrought	$14.50 to 15.00
No. 2 R. R. wrought	13.50 to 14.00
Arch bars and transoms	17.50 to 18.00
Knuckles, couplers and springs	15.00 to 15.50
Shafting	17.00 to 17.50

PHILADELPHIA.

Important Tonnage of Low Phos. Iron Under Negotiation—Steel Scrap Weak and Lower.

Dec. 21.

Pig Iron.—An interesting feature of an otherwise quiet market is the considerable volume of inquiry for low phosphorus pig iron now under negotiation, this including two blocks of 3,000 tons each for eastern and western Pennsylvania delivery and aggregating fully 12,000 tons. Low phosphorus buying is always spasmodic and there have been no recent transactions of importance to establish the market price clearly, hence the prices secured on this business will be watched with interest. There is absolutely no current business in basic, though two or three consumers are willing to place moderate tonnages for first half delivery at $18.50, or 25 cents under the market. We note sales of 1,000 tons of gray forge at $17.50, delivered, with unconfirmed reports of other buying at $17.40; of 1,000 tons of No. 2X Virginia at slight concessions; of two 500-ton blocks of charcoal iron at full prices; and of scattered foundry lots on a somewhat lower basis, especially for spot and early shipment, the situation being a little easier through the efforts of middlemen and a few producers to clear up odd tonnages before inventory time. The regular meeting of the Eastern Pig Iron Association last Wednesday showed only a trifling change in stocks on furnace yards and the volume of unfilled orders on books to be enormous. Coke producers from the Connellsville district continue to make lower quotations in the effort to induce local furnace interests to cover the remainder of their first half requirements, but the latter are inclined to buy only from hand to mouth, being able to pick up desirable West Virginia coke at $2, ovens, for immediate shipment, with prompt Connellsville at $2.50 to $2.65, ovens. No further developments in foreign iron have come to light, with the exception that the importation of low

phosphorus is no longer possible. We quote, first quarter delivery at eastern Pennsylvania consuming points, as follows:

No. 1X foundry	$19.50 to 20.00
No. 2X foundry	19.00 to 19.50
No. 2 plain	18.50 to 19.00
Standard gray forge	17.50 to 18.00
Basic	18.75 to 19.00
Low Phosphorus	22.50 to 23.50
No. 2 Birmingham	19.00 to 19.50
No. 2X Virginia	19.50 to 20.00
No. 2 plain Virginia	19.00 to 19.50

Finished Materials.—The week has witnessed extremely heavy specifying against contracts expiring with the year, but the market has been quiet so far as new business is concerned, as is natural at this season. Some further curtailment of operations may be necessary on the part of steel works dependent for their outlet upon the rail market, as eastern roads have ordered practically nothing for some time. The fact is that railroads throughout the year have had to limit their expenditures and naturally have confined their buying chiefly to rolling stock, on which prices were unusually low, deferring their purchases of rails, the price of which does not change. One estimate is that rail orders placed during 1909 amount to only about 50 per cent of the present capacity, and of this business western mills have taken the bulk.

An early decision is anticipated on the steel requirements of the Vine Street pier substructure, and a good tonnage will be needed for a 10-story addition to the Curtis Publishing Co. plant, the general contract for which has been taken by W. J. Doyle & Co. Bar iron prices show a wide range, some mills quoting as low as 1.50c, mill, while a lot of 300 tons was closed recently at 1.80c. Open-hearth billets continue at $30, eastern mill, and slabs have sold on about that basis. We quote, Philadelphia delivery: Structural plates and shapes, 1.70c to 1.80c; steel bars, 1.60c to 1.70c; bar iron, 1.60c to 1.75c; open-hearth billets, rolling, $30.60.

Old Materials.—The market has concerned itself chiefly during the past week with the reduction of the associated mills' buying price to $17, delivered, which action is explained on the grounds that the supply of desirable scrap had become larger than could readily be absorbed and that pressure upon the mills to receive shipments had resulted in embargoes at at least two important consuming points. This increase in offerings was due in part to profit-taking on accumulations held for a considerable time, in part to the more general operation of plants producing this line of scrap, in part to generous importations and in part to the more extensive use of the duplex process, increasing the consumption of pig iron at the expense of scrap. Following a meeting in this city during the week, participated in by dealers not in sympathy with the joint buying arrangement, a committee is at work devising methods of combined opposition to its continuance. While $17 flat is the associated price, not much scrap is available at this level and some buying has been done at higher figures. The associated mills also announced reductions on other important lines. The market is largely nominal, but we quote, gross tons, delivery at eastern Pennsylvania, consuming points, as follows:

Old steel rails (rerolling)	$18.50 to 19.00
Relaying rails	21.00 to 21.50
No. 1 steel scrap	17.00 to 17.50
Old car wheels	15.00 to 15.50
Old iron car axles	22.00 to 23.00
Old steel car axles	20.00 to 20.50
Heavy melting steel	14.75 to 15.25
No. 1 railroad wrought	18.00 to 18.50
Iron track scrap	16.00 to 16.50
Wrought pipe	14.00 to 14.50
Cast borings	9.50 to 10.00
Wrought turnings	12.50 to 13.00
Heavy cast scrap	15.00 to 15.50
Railroad malleable	14.00 to 14.50
Stove plate	13.00 to 14.00

NEW YORK.

Options on Port Henry Ore Closed—Municipal Building Contract Held Up.

Office of THE IRON TRADE REVIEW,
Room 1005, No. 90 West St., Dec. 21.

Iron Ore.—Options on the Port Henry ore for 1910 delivery were scheduled to expire yesterday, and it is learned that practically all have been taken up with many requests for increases, hence the tonnage disposed of in this way was close to that which will be available. Otherwise the eastern ore situation is quiet, though receipts at the Philadelphia port are unusually heavy. An ore embargo is on at the Worth Bros. Co. plant, Coatesville.

Pig Iron.—Nothing has occurred to disturb the extreme holiday quiet into which the entire eastern market has fallen. Current inquiries are so few and involve such limited tonnages that they are practically all being taken by speculative interests or furnaces desiring to clear up their yards before the close of the year, hence little business is going to the more substantial producers, who are holding firmly at old figures. At the same time there are signs below the surface which indicate that a very considerable inquiry for second and third quarter delivery will develop soon after the beginning of the year. A leading merchant interest will have a cargo of No. 3 Middlesboro iron at Philadelphia during the coming month, but the arrangement for this tonnage has already been noted. The Corporation's blast furnace output continues extremely high, evidencing good fortune at its various plants, and, in spite of its tremendous consumption, is now accumulating a little iron. We quote, delivery at New York tidewater over the first quarter, as follows:

Northern foundry No. 1	$19.50 to 20.00
No. 2X foundry	19.00 to 19.50
No. 2 plain	18.50 to 19.00
No. 2 southern foundry	19.00 to 19.50
Malleable	19.50 to 20.00
Gray forge	17.75 to 18.25

Ferro-Alloys.—Ferro-manganese is easier, with recent sales of about 2,000 tons, 1,500 tons of which was taken by one local interest. It is stated that $44.50, seaboard, now represents the market for prompt and first quarter metal and that buying for all of 1910 can be done at $45, although certain interests are unable to quote lower than $47. There is no activity in ferro-silicon.

Finished Materials.—By the securing of an injunction, returnable Dec. 23, secured by the president of the Citizens' Union, the awarding of the contract for the superstructure of the Municipal office building has been held up. The Thompson-Starrett Co. is low bidder, with $5,845,000, and all of the seven bids are well below the architect's estimate. It is anticipated that the steel requirements will run close to 25,000 tons, all of which will be delivered during the coming year. Bookings in the east during the week include no important tonnages, though the aggregate was fairly large. The Southern Railway has divided 2,500 tons of bridge work among the American Bridge Co., which secured half, the Phoenix Iron Co. and the Virginia Bridge Co. The Boston Bridge Co. will supply 500 tons for the state capitol extension at Augusta; Levering & Garrigues will furnish 550 tons for local school No. 77; Wills & Marvin have the contract for the Metropolitan museum extension, 1,000 tons; the Hay Foundry & Iron Works Co. has taken a loft on Twentieth street, 800 tons; and the American Bridge Co. will supply 900 tons for the Bush Terminal Pier No. 6, 500 tons for a bridge for the Oliver Iron Mining Co., 120 tons for a North Carolina railway bridge and 1,100 tons for the Chicago telephone exchange. The McClintic-Marshall Construction Co. will furnish an 1,800-ton double-track bridge for the Long Island railroad. A considerable scattering of work is in prospect. Bids have been taken on 3,500 tons of bridge work for the Delaware & Eastern; an early decision is anticipated on the Springfield municipal buildings; a factory and warehouse building for Heywood Bros. & Wakefield, on Thirty-fourth street, requiring 3,500 tons,

is under negotiation, and several small lots of bridge work are up for eastern railroads.

Plain materials are a bit easier, 1.55c, Pittsburg, being quoted rather freely on shapes and plates and 1.50c being done on desirable tonnages. Current specifications are not especially heavy, as the full tonnages have generally been taken out on contracts expiring Jan. 1; no tonnages will be left unspecified. We quote, New York delivery, as follows:

Angles, 3 to 6 inches x ¼-inch and heavier, 1.71c to 1.81c; beams, 3 to 15 inches, 1.71c to 1.81c; tees, 3 x ¼-inch and heavier, 1.71c to 1.81c; plates, carload, tank, 1.71c to 1.81c; marine boiler, 2.06c to 2.16c; bar iron, 1.65c to 1.70c; soft steel bars, 1.61 to 1.66c; sheets, No. 28, black, 2.46c.

Cast Iron Pipe.—Further delays in connection with the Albany avenue water main in Brooklyn will throw the award of that contract over to the incoming administration. The city is to open bids Dec. 31 on a small lot of pipe, but none of the tonnages involved in recent contractors' lettings have reached the foundries as yet. Indications are that the demand for spring delivery through this district and New England will be particularly heavy. An inquiry is current for 5,500 tons for Japanese delivery.

Old Material.—The market in the Metropolitan district is thoroughly quiet, though somewhat disturbed by the lowering of the association price on heavy melting steel and other important lines. There is little disposition among local dealers, however, to enter into an organized movement against this organization. We quote, gross ton prices which dealers are willing to pay for New York delivery, as follows:

Old steel rails (re-rolling)	17.00 to 17.50
Relaying rails	21.00 to 21.50
Old car wheels	15.00 to 15.50
Old iron car axles	23.00 to 24.00
Old steel car axles	20.00 to 20.50
Heavy melted steel	14.75 to 15.25
No. 1 railroad wrought	18.00 to 18.50
Iron track scrap	16.00 to 16.50
Wrought pipe	14.00 to 14.50
Cast borings	9.50 to 10.00
Wrought turnings	12.50 to 13.00
Heavy cast scrap	15.00 to 15.50
Railroad malleable	14.00 to 14.50
Stove plate	11.50 to 12.00
Grate bars	12.00 to 12.50

BRITISH IRON MARKET.

Little Recovery in Pig Iron—Bars Trade Least Satisfactory.

Office of THE IRON TRADE REVIEW.
Prince's Chambers, Corporation St.,
Birmingham, Eng., Dec. 11.

A little recovery was noted in pig iron this week, and at the Birmingham market on Thursday a considerable amount of business was got through, though in some cases at rather lower prices. Consumers have concluded that the present is a good time to renew their orders. Everybody expects that the new year will see a marked improvement. In the Cleveland market there is a marked recovery from the cold fit of last week, partly due to the more satisfactory board of trade returns, showing a steady recovery of general trade. So far, the exports in December total 14,981 tons, as compared with 20,000 tons last month, and stocks have now reached 370,531 tons, an increase this month of 13,000 tons. The business with America is disappointing, but quite a number of steamers are now loading on the Tees wharves, including the large steamer Castalia, taking on a cargo at the wharf of Wilson, Pease & Co. Pig iron is now obtainable at 50s 9d ($12.42). There are now 83 blast furnaces operating in the north of England, of which 33 are making hematite, spiegel and other special iron, and 44 are producing ordinary Cleveland pig iron. The hematite department is steadily gaining strength.

Finished Material.—Not much change is noted, and in the Midland district business is decidedly dull. An important exception is galvanized sheets, in which the tone is buoyant, the November returns showing an increase of £11,000 in the value of exports as compared with last year. The various branches of the hoop trade are quiet, and the demand for hoops is only moderate. The bar department is least satisfactory, competition for orders being extremely keen, and manufacturers are taking them at prices which involve certain loss, but which are accepted to find the men employment. The revival in ship building has not yet materially improved the chain and anchor trade in which orders are still scarce.

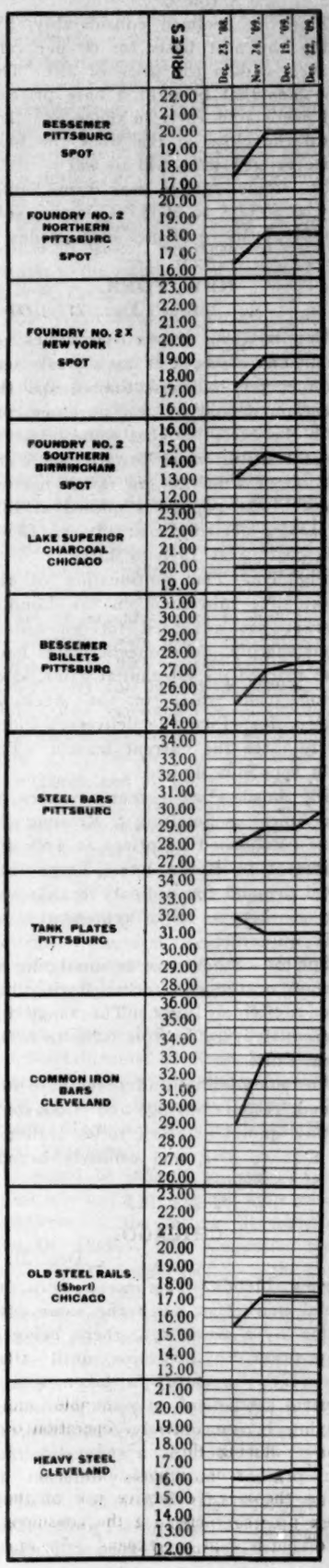
METAL MARKETS.

ST. LOUIS.

Dec. 20.

Lead and Zinc.—Shipments of ore from the Missouri-Kansas-Oklahoma district were exceptionally good last week, lead ore selling at $57 a ton for 80 per cent grades, an advance of $3 over the previous week. A gain in St. Louis pig lead, which was firm at $4.50 and $4.60 Saturday, is said to have caused the increase. As a result of one of the heavy lead ore buyers having been out of the market for several months because of having laid in a surplus of ore, the prices have

PRICE CHART.



been somewhat lower than they otherwise would be. The bulk of the shipments made last week were at from $55 to $56 a ton.

Zinc ore declined considerably, $51 being the best basis for 60 per cent grades, with a top price of $53. The few bins that brought a base price of $51 were sold early in the week. Toward the close of the week the base price ranged from $48 to $50.

St. Louis spelter was firm Saturday at $6.12½ to $6.15. Calamine sold for $28 basis of 48 per cent grades.

NEW YORK.

Dec. 21, 1909.

Copper.—The market continues on about the same basis as a week ago, with current business limited and the situation devoid of new developments with the exception that some progress is still being made toward the completion of a merger on rather narrow lines. Lake copper is quoted at 13⅝ to 13¾c, electrolytic at 13¼ to 13½c, and casting at 13⅛ to 13¾c.

Pig Tin.—The continuation of the speculative movement in the London market has advanced foreign quotations sharply, and domestic prices have also marked up substantial gains, sales being made early in the week at 33.75c for forward delivery, which fairly rates the current market. The spot supply is limited.

Pig Lead.—Two recent advances by the American Smelting & Refining Co. have established its prices at 4.60c for shipment in 50-ton lots. There is a good demand for ordinary brands and the market is fairly represented by this quotation.

Spelter.—Stocks are accumulating in certain centers, as recent buying has been extremely light. The range for current delivery is from 6.20c to 6.30c, New York.

Antimony.—Slight advances have followed recent buying and Cookson's is now quotable at 8½c to 9c, Hallett's at 8¼c to 8⅜c, and ordinary brands at 8c to 8¼c.

CHICAGO.

Dec. 21.

New Metals.—This week finds the metal market in much the same condition as a week ago, there being a disposition to go slow until after the yearly inventory is taken, and a general settlement of odds and ends. Buying is not entirely suspended, of course, but there is a suggestion that the present month is different in some respects from others. Lead is again a little stronger, while other metals are selling at former prices.

We quote as follows: Lake copper, carload lots, 13¾c to 14c; casting copper, 13⅜c to 13½c; smaller lots, ¼c to ¾c higher. Spelter, 6.15c to 6.25c; lead, desilverized, 4.65c to 4.70c, in 50-ton lots; corroding, 25c per 100 pounds higher; sheet zinc, $8 list f. o. b. La Salle in car lots of 600-pound casks; pig tin, 34c to 34½c; Cookson's antimony, 10½c; other grades, 9¾c to 10¼c.

Old Metals.—Previous prices still are quoted in this line, and business is of the seasonable kind, being quiet and without other feature, as is usual at the turn of the year.

We quote, dealers' selling prices, as follows: Copper wire, 13¼c; heavy copper, 13¼c; light copper, 11½c; heavy red brass, 12½c; heavy yellow brass, 10c; light brass, 7½c; No. 1 red brass borings, 10c; No. 1 yellow brass borings, 8c; brass clippings, 9½c; tea lead, 3.85c; lead scrap, 4⅜c; zinc, 4⅞c; tin pipe, 32c; tin foil, 29c; pewter, 23c; electrotype plates, free from wood, 4½c; electrotype dross, 3¼c; stereotype plates, 5c; stereotype dross, 3½c; prime slab zinc dross, $78 per ton.

ABOUT TWO MILLIONS

Will be Distributed as Bonus to Steel Corporation Employes.

New York, Dec. 22. (By wire.)

E. H. Gary, chairman of the United States Steel Corporation, today gave out this statement: "The United States Steel Corporation is distributing a bonus to the officers and employes of the Corporation and subsidiary corporations, in accordance with its annual practice based on circular letters issued at the beginning of 1903. The amount is determined as usual by the annual earnings. The sum distributed for 1909 amounts to a little over $2,000,000. This will be paid 60 per cent in cash and 40 per cent in preferred stock at 124 or common stock at 90, in accordance with the wishes of the recipients, so far as practicable and convenient, and delivered upon conditions specified in circular letters; also the usual opportunity will be given to subscribe for 25,000 shares of the preferred stock of the Corporation at 124 upon the usual conditions stated in circular letters."

The Quincy, Manchester, Sargent Co., Plainfield, N. J., announces that on Jan. 1 it will move the western office from 1775 Old Colony building to 738 First National Bank building, Chicago, and its interests in the west will hereafter be taken care of by John C. Hoof.

RAIL SALES

To Harriman Lines Make Large Tonnage in Six Months.

New York, Dec. 22. (By wire.)

The Illinois Steel Co. reports rail sales of 31,000 tons in addition to the Illinois Central tonnage previously reported. Harriman line purchases since June aggregate well over 200,000 tons. The Buffalo, Rochester & Pittsburg purchase of 9,000 tons divided among Bethlehem, Carnegie and Lackawanna companies, was made several months ago. The Bethlehem Steel Co. has sold 8,000 tons to the Delaware & Hudson, and another interest notes a round tonnage to a frog and switch concern. Sales of the leading interest so far this month are understood to have been extremely heavy.

CONDITIONS AS TO SOUTHERN PIG IRON.

Cincinnati, Dec. 22. (By wire.)

Referring to Daily issue of Dec. 21, there has been a misapprehension here as to the meaning intended to be conveyed in the prices mentioned at the end of the Cincinnati dispatch, on page 2. What the writer meant to say was that during the buying movement in August and September, so much iron was sold for long forward delivery that on other orders the southern furnaces will be shipping iron during the first quarter of next year at prices running from $13.50 to $14.50, Birmingham, and the northern furnaces will be shipping iron on their old orders at prices running from $15.50 to $16.50, although on new business the southern furnaces are asking from $14 to $15, Birmingham, there being a considerable range of individual opinions regarding quotations, while the northern furnaces are firm at $17, f. o. b. cars, Ironton.

MORE SALES OF PIG IRON AT $17, VALLEY.

Pittsburg, Dec. 22. (By wire.)

Further instances are noted in Pittsburg territory of $17, valley, quoted on No. 2 foundry for prompt shipment during the past few days.

The Pressed Steel Car Co. begins turning out cars at the re-opened Woods Run plant, Friday. New car business is light.

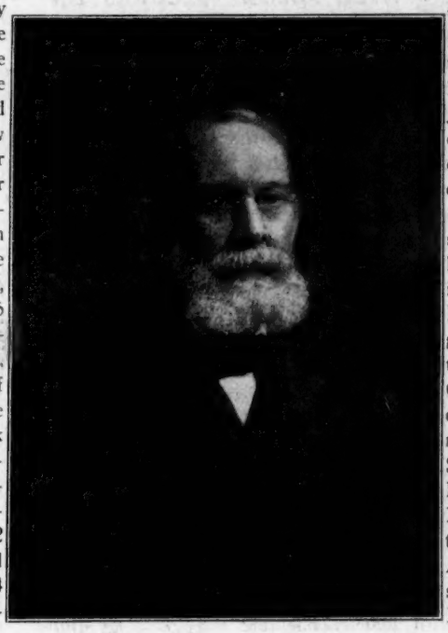
The annual convention of the Southern Supply and Machine Dealers' Association will be held at Atlantic Beach, Fla., near Jacksonville, Wednesday to Friday, April 6 to 8. Alvin M. Smith, Richmond, Va., is secretary-treasurer.

DEATH OF DR. CHARLES B. DUDLEY.

Dr. Chas. B. Dudley, chief chemist of the Pennsylvania railroad, died Tuesday, Dec. 21, at his home in Altoona, Pa. As a testing engineer he won international fame, and through his skill and rare judgment Pennsylvania specifications have become noted throughout the railroad world, where they are today largely accepted as standards. To him a large measure of credit is due for the rapid advancement of the American Society for Testing Materials to a position among the foremost technical societies of the world. At the time of his death he was president of this organization, and has served in that capacity almost continuously since its formation.

Chas. B. Dudley was born at Oxford, Chenango County, N. Y., July 14, 1842, of New England parentage. His early years were spent in attending the village school, and later the Academy, in the fall and winter, and in working on the farm in summer. In 1862 he enlisted as a private soldier in the 114th New York Volunteers, and spent the greater part of the next three years in the war of the Rebellion. He was in seven battles and was finally severely wounded in the battle of Opequan Creek, in the Shenandoah Valley, on September 19, 1864. Returning from the war in 1865 he began to prepare for college at Oxford Academy and Collegiate Institute, and entered Yale College in the fall of 1867, graduading in the class of '71. The next year was spent in newspaper work in New Haven, obtaining means to prosecute further studies and to pay off obligations already incurred during the previous four years. In the fall of 1872 he entered the Sheffield Scientific School of Yale College, and graduated in 1874 with the degree of Ph.D. The next college year was spent as assistant to Dr. Geo. F. Barker, professor of physics at the University of Pennsylvania. On November 10, 1875, he accepted the position of chemist of the Pennsylvania railroad, at Altoona, and at that time no railroad had a chemist as a regular employe, although many of them had occasional chemical work done. At that time the whole subject of the relation between scientific knowledge and its practical use by railroads was in a very chaotic state. There were few, if any, specifications. The study of the valuable properties of metals and other materials used in construction was in its infancy. Furthermore, the study of materials from the standpoint of service had only just begun. The study of materials from the standpoint of the maker, that is, how to manufacture a given product successfully, had made much more progress; but whether that product so manufactured would give the best results in actual service, was largely an unknown field. To Theodore N. Ely, chief of motive power of the Pennsylvania Railroad Co., is due the credit for the conception and the belief that there was room in a railroad organization for an experimental department, and the securing of a chemist was one of the steps in the development of his idea.

Of the work done by Dr. Dudley during the 34 years of his life in Altoona, perhaps that which has attracted the most wide-spread public attention was the study of steel rails made early in the 80's. The plan of the investigation constituted in taking from the track about 100 rails whose history was known, approximately one-half of which had given inferior service, and the other half better service, and these rails were subjected to both physical tests and chemical analysis. The



DR. CHARLES B. DUDLEY.

results of the study seemed to point very clearly to the conclusion that mild or softer steel gave not only a better rail, but also one that suffered much less loss of metal by wear than harder steel. The results were so contrary to the commonly accepted views on the subject, and were so antagonistic to the interests of the rail manufacturers, that they were received with incredulity.

Another and very important line of work in connection with the laboratory of the Pennsylvania railroad in Altoona during these 34 years has been the making of specifications for materials. No specification has been made without exhaustive study of the conditions under which the material does its work, and these studies have not infrequently required two or three years, or even longer, before a specification would be forthcoming. Special investigations and studies leading to modifications of practices prosecuted under Dr. Dudley's guidance embraced such various subjects as car lighting, steam heating of cars, studies of disinfectants, cast iron for car wheels, paints, bearing metals, analyses of coal, examination of water supplies and quite an exhaustive study of explosives, resulting in the formation of rules governing the transportation of these and other hazardous materials. Dr. Dudley was sent abroad twice on business of the company, once in 1886 to study oil burning on locomotives in Russia, and again in 1900 as delegate to the International Railway Congress in Paris.

When he presided over the deliberations of the American Society for Testing Materials he always took an active part in the discussions, and his fund of information, which seemed almost without limitation, added greatly to the interest in these gatherings. His presidential address entitled "Enforcement of Specifications," delivered at the Atlantic City meeting in June, 1907, is considered by engineers a classic on this subject. He revised the difficulties encountered in the enforcement of specifications, and the reasons for the failure of manufacturers to live up to specifications were gone into at great length. At the 1909 meeting of the American Society for Testing Materials, Dr. Dudley was appointed one of the delegates of this organization to the International Congress held in September at Copenhagen, and presented the invitation of the American organization to hold the next international meeting in the United States, two years hence. At this meeting, Dr. Dudley was chosen president of the International Society for Testing Materials. He was twice president of the American Chemical Society and also served as vice president of the American Institute of Mining Engineers. He was a member of the English, French and German Chemical Societies, of the Iron and Steel Institute of Great Britain, the Verein Duetcher Eisenhuttenleute, Society of Civil Engineers, Mining Engineers, Mechanical Engineers and Electrical Engineers.

It would be difficult to name an engineer who had a greater and more varied experience in the testing of materials than Dr. Dudley. He was called upon to test and pass judgment upon the quality of nearly all of the materials employed by one of the greatest, if not the greatest, railroads in the world, involving an expenditure of millions of dollars annually. It was said of Dr. Dudley that he had no acquaintances—only friends, and to have known him was to have loved him.

The Gadsden, Ala., blast furnace of the Southern Iron & Steel Co. was lighted Dec. 15, after being overhauled.

GLOBE ROLLING MILL CO.

Taken Over by the Bourne-Fuller Co., Which Will Largely Increase Stock.

Negotiations which have been pending for some time have been concluded by which The Bourne-Fuller Co., Cleveland, acquires the property and assets of the Globe Rolling Mill Co., Cincinnati.

The Bourne-Fuller Co. appreciates that in connection with its Cleveland operations, this additional distributing point is a favorable one for the general trade in the south and southwest, as well as a convenient source of supply for the large trade in and tributary to Cincinnati. It is understood that with this in view it is planned to largely increase the present warehouse stock in Cincinnati, with additional and improved facilities for handling and cutting structural and other material, in an endeavor to better serve the important trade which has been handled by the Cincinnati company, in connection with that regularly supplied by The Bourne-Fuller Co. from its Cleveland warehouses.

T. H. Carruthers, formerly president of the Globe Rolling Mill Co., and C. F. Lansing, secretary of that company, remain actively and financially interested, and in direct charge of operations in Cincinnati.

The Globe company has not operated a rolling mill for many years, but has a fine organization of salesmen and has been doing a heavy jobbing business.

TO PROVIDE BETTER HOMES.

A long cherished plan of Edgar S. Cook, president of the Warwick Iron & Steel Co., has been to provide for the company's foreign workmen at Pottstown, Pa., better homes than they have been occupying, close to the company's furnaces. A farm on the opposite side of the Schuylkill river has been purchased and the construction of houses in blocks of two has been begun. Each will have five rooms, bath room, etc. The little settlement will be provided with a public park with swings, etc., for the children, cement sidewalks for the town, and a hall for entertainments.

NEW PLANT FOR GARY IRON & STEEL CO.

Announcement was made Tuesday by the Gary Iron & Steel Co. that it will remove the manufacturing end of its business from this city to the Crab Creek valley, near Youngstown, O., upon the completion of its new sheet steel and tin plate mill to be erected there. The new mill, the construction of which will be begun in the early spring, will have an annual capacity of 35,000 tons per year, and according to the present plans, will be placed in operation early next fall. In order to carry out these plans, the company will increase its capital stock considerably, from $500,000 to probably $750,000.

The jobbing department, including office and warehouse, will continue in this city to take care of its local jobbing trade in sheets, tin plate, prepared roofing, extended lathing, etc. The officers of the company are as follows: George D. Wick, Youngstown, president; Samuel Siddall, Cleveland, vice president and treasurer; Philip Wick, Youngstown, assistant treasurer; J. C. Wicks, Cleveland, secretary and manager of sales. H. M. Reed, formerly assistant city engineer of Youngstown, has been retained by the company as chief engineer.

WILL SECURE FIGURES ON COST OF OPEN-HEARTH PLANT.

Directors of the Ohio Iron & Steel Co., with offices in Youngstown, O., and a blast furnace at Lowellsville, O., have decided to submit to stockholders at a meeting called for Jan. 20 a proposition to increase its capital from $500,000 to $5,000,000. It has been suggested that, if the capital stock be increased, a building program will be decided upon looking to building six open-hearth furnaces, a 34-inch blooming mill and finishing mills. At a recent meeting of the directors an advisory committee, including President Robert Bentley as chairman, was named to secure estimates on the probable cost of the proposed improvements.

PROFITABLE YEAR CLOSED.

The Harrisburg Pipe & Pipe Bending Co., Harrisburg, Pa., according to reports submitted at the close of the year which ended in November, has completed one of the most successful years since the establishment of the plant. Production in the pipe mill was more than doubled, while the open-hearth and billet mills increased their figures The following directors were re-elected: J. H. Patton, Charles A. Kunkel, E. Z. Wallover, W. T. Hildrup and D. E. Tracy.

Pittsburg aluminum and related companies have filed recent notices of large increases of stock with the secretary of the state of Pannsylvania. The United States Aluminum Co. has increased from $250,000 to $2,000,000; the Aluminum Ore Co., from $5,000 to $2,000,000; and the American Bauxite Co., from $5,000 to $2,000,000.

ANNUAL REPORT

Colorado Fuel & Iron Shows Substantial Surplus of Assets.

The annual report of the Colorado Fuel & Iron Co. now issued in pamphlet form contains a large amount of information as to the affairs of the company not shown in its capital account published last September. The consolidated balance sheet, based on the appraisement of last June, shows liabilities including capital stock of $100,556,475, and a surplus of assets amounting to $19,308,327. The surplus for the year was $858,375. The earnings and expenses for the years ending June 30, 1908 and 1909, compare as follows:

EARNINGS.

Iron dept.	$12,058,228	$13,175,747
Indust. dept.	7,889,910	8,486,085
Denver retail dept.	396,492	438,048
Total	$20,344,630	$22,099,880

OPERATING EXPENSES.

Iron dept.	$ 9,952,935	$11,342,580
Indust. dept.	6,894,936	7,571 136
Denver retail dept.	379,930	408,348
Total	$17,227,801	$19,322,064

ORE ROADS AFTER CARS.

The Duluth & Iron Range and the Duluth, Missabe & Northern are each in the market for 1,000 steel ore cars, and the Atlantic Coast Line is about to close on 300 steel-underframe flats. Inquiries for 2,000 cars from the Harriman Lines, principally steel-underframe refrigerators, and for 750 steel-underframe boxes from the Toledo, St. Louis & Western, are reported. The Reading purchase was 1,500, of which the Cambria Steel Co. will build 500 all-steel gondolas and the Standard Steel Car Co. 1,000 steel underframe boxes.

PASSAIC STEEL AFFAIRS.

Because of technicalities, confirmation of the sale of the Passaic Steel Co. properties at Paterson, N. J., to the bondholders has been delayed, hence no announcement regarding a reorganization and the future of the plant could be made. It is anticipated that the sale will be confirmed on Monday. The fabricating shop of late has been executing considerable work for other fabricating interests.

The directors of the Seneca Chain Co., whose plant at Kent, O., was badly damaged by fire Dec. 10, have decided to rebuild at once, very likely at Kent. The company has been enabled to take care of its customers because of having another well equipped plant at Mansfield, O.

BIG DEALS

IN COKING COAL LANDS ARE PUT THROUGH.

Over Six Thousand Acres Purchased in Low Sulphur Belt of West Virginia—J. V. Thompson Buys in Fayette County, Pa., and Sells to W. J. Rainey Co.

Two very important deals in coking coal lands have just been put through at Pittsburg.

John H. Jones, president of the Pittsburg-Buffalo Co., of Pittsburg, and his assiciates have purchased more than 6,000 acres of coking coal in the low sulphur belt in the Fairmont district. The coal is located in Marion county, West Virginia. A tract of 3,600 acres between Little Bingamon and Tevebaugh Creeks was purchased from Rembrandt Peale, president of Peale, Peacock & Kerr, of New York, and 2,450 acres, known as the Davis Coal & Coke Co. property, from the Western Maryland railroad interests.

Immediately surrounding this block of coal are the holdings of the Fairmont Coal Co. and the territory of the Little Kanawha Syndicate of almost 60,000 acres, which is owned jointly by the Pennsylvania Railroad, New York Central Lines and the Baltimore & Ohio railroad, and the Georges Creek Coal & Iron Co. property of 8,000 acres. To the southwest and west of this property are the Dola coal field and the Short Line Fuel Co., both interests owned by J. V. Thompson and his associates. In the same basin to the north is the Western Maryland railroad coal field of more than 20,000 acres, and the large holdings of J. V. Thompson in Greene county have a similar physical location and adjoin the property owned by the Kanawha Syndicate and the Western Maryland railroad.

It is proposed to develop the property and contracts will be let in the next 30 days on shafts, slopes, etc. The Four State Coal & Coke Co. is to be organized by Mr. Jones and his associates, and will have holdings in the Coal river district and elsewhere.

Thompson Buys and Then Sells to Rainey.

J. V. Thompson, president of the First National Bank of Uniontown, Pa., has purchased 577 acres of high grade coking coal, located in Luzerne and Redstone Townships, Fayette county, Pa., along the Dunlap Creek branch of the Monongahela River Railroad, owned jointly by the New York Central and the Pennsylvania lines. The tract adjoins the properties of the Union Connellsville Coke Co., James R. Cray, president, the W. J. Rainey Coke Co., and the Republic Iron & Steel Co., and is practically the only undeveloped piece of high grade coking coal of such size in that region. There are a few scattered farms remaining unsold in the lower Klondike basin.

It is in the same basin as the holdings of the Thompson-Connellsville Coke Co., the Tower Hill Connellsville Coke Co., The Century Coke Co., Orient Coke Co., and others.

Mr. Thompson purchased this coal from the Union Coke Co., of which R. L. Ireland and M. Andrews of the M. A. Hanna Co., and others of Cleveland, are owners. The consideration is said to be in the neighborhood of $1,800 to $1,900 per acre. This purchase included 80 acres of surface along the Dunlap Creek branch of the Monongahela River railroad.

Mr. Thompson promptly sold the property to the W. J. Rainey Coke Co., which will proceed immediately with the development of the tracts.

TEXAS IRON INDUSTRY IS POLITICAL STORM CENTER.

Another investigation of the state of Texas' iron industry at Rusk, is being made by the prison board. The Sam Lanham blast furnace at Rusk has just closed down after operating 45 days. Some claim is made by politicians that the cost of pig iron production per ton by the Sam Lanham stack has been too high. The iron which is made in the furnace by convict labor, is turned into cast iron at the penitentiary. The iron ore and limestone are also mined by convicts.

This Texan iron industry is periodically the center of considerable political turmoil. This time the statement is made, unofficially, that the state may abandon permanently the making of pig iron and of cast iron pipe after it has used the 3,000 tons of pig iron on hand, and worked out the 10,000 tons of ore now stripped and stacked, and 6,000 tons awaiting piling. There are 50 cars of coke in the prison yards for use in the blast furnace, and 20 more cars are on the road.

The American Smelting & Refining Co. has advanced the price of lead from $4.60 to $4.70 per 100 pounds in 50 pound lots. This is the second rise within a week, aggregating 20 cents in all.

HEROULT FURNACE INSTALLATIONS.

Several Contemplated Will Probably Be Larger than the 15-Ton Type.

Negotiations now under way may result in the licensing of several additional installations of the Heroult electric steel-making furnaces in this country. At present there are only three American licensees, the Halcomb Steel Co., Syracuse, N. Y.; the Firth-Sterling Steel Co., McKeesport, Pa., and the United States Steel Corporation. The licenses to the last named interest were made during the current year and permit the operation of a considerable number of electric furnaces at its various plants in conjunction with both Bessemer and basic open-hearth furnaces. Under their provisions, one 15-ton Heroult furnace is now in continuous operation at the South Chicago Works of the Illinois Steel Co. and another of the same capacity is nearing completion at the Worcester works of the American Steel & Wire Co., to run in conjunction with a basic open-hearth furnace. A number of additional furnaces are contemplated, but they will probably be larger than the 15-ton type.

In Europe and Great Britain, the process has made considerable advance during the year. R. H. Wolff, 445 Broadway, New York, who is the American representative for the Heroult interests, advises us that three or four licenses have been granted to English steel-makers; heretofore the firm of Edgar Allen & Co., Sheffield, has been the only English licensee. The number of licenses on the Continent has been increased by about a half-dozen concerns of late.

NEW PRESIDENT OF EASTERN PIG IRON ASSOCIATION.

Leonard Peckitt, president of the Empire Steel & Iron Co., was elected president of the Eastern Pig Iron Association at its meeting in Philadelphia Wednesday. He succeeds E. S. Cook, president of the Warwick Iron & Steel Co. W. S. Pilling, of Pilling & Crane, was re-elected secretary. The reports presented at this meeting showed the statistical position of eastern furnaces to be little different from that of a month ago. There has been no accumulation of iron on furnace yards.

Keystone furnace of the Reading Iron Co., Reading, Pa., which recently went into blast after extensive repairs, is out again temporarily.

THE OPEN SHOP

Attitude of N. M. T. A. Was Strongly Commended.

At the quarterly dinners and business meetings of two important branches of the National Metal Trades Association, the advanced stand taken by the Association for the open shop was strongly endorsed. The plans of the Association, aiming to enlarging its membership in every part of the country and spreading widely the doctrine of the open shop, were heartily commended.

The quarterly meeting of the Cincinnati branch was held Dec. 15. John W. Neil, of the McGowan Pump Co., president of the branch, presided. A feature of the evening was the presence of about 100 university students taking the engineering course under the co-operative plan, the students having been invited to hear the lecture of W. H. Tolman, director of the Museum of Safety and Sanitation, New York City. Dr. Tolman spoke on the subject of the prevention of accidents in shops and sanitary measures for employes in factories, the lecture being illustrated with stereopticon views. C. H. Norton, of the Norton Grinding Co., Worcester, Mass., declared for more pronounced co-operation between the manufacturer along machinery lines and the designer, inventor and builder of machines. In an interesting description of the manufacture of grinding wheels, Mr. Norton described the manufacture of the abrasive wheel, which has succeeded the old emery wheel. He referred to the grinder not as merely a polishing machine, but as a revolving cutter for removing metal. John Kirby Jr., of Dayton, O., president of the National Association of Manufacturers, advanced the view that whatever legislation may be enacted for the real betterment of labor conditions, for the prevention of accidents, for the better compensation and provision against incapacity of employes, ought to be introduced and be backed by the manufacturers and not by demagogic labor leaders. He heartily endorsed the principles of the National Metal Trades Association, asserting his belief that this organization has done more lasting good for labor than all other similar organizations combined. Charles H. Davis, of the Warner Gear Co., Muncie, Ind., speaking on behalf of the guests from that city, said that a nucleus had been formed in Muncie, and that quite likely a branch would be established there. Howard P. Eells, of the Bucyrus Co., Cleveland, president of the National Metal Trades Association, after sketching briefly the organization of the Association, commended the Cincinnati branch and declared that its commanding position was the result of the enthusiastic personal interest of its members. F. A. Geier, of the Cincinnati Milling Machine Co., said that while in the beginning the Association was organized to combat the unjust demands of labor, yet with progress it was seen that the labor problem is an involved one, and that its solution need be sought only when separated from strife and when given wise and temperate consideration.

The quarterly dinner of the Rhode Island branch of the association was held at Providence on Dec. 17. The chairman was E. W. Beaman, of the Beaman Smith Co., Providence, R. I. M. H. Barker, of the American Machine Tool Co., Boston, spoke of the wonderful growth of the National Metal Trades Association, due largely to its excellent work, it being the first national organization to stand for the open shop. C. W. Hobbs, of the Hobbs Mfg. Co., Worcester, Mass., told why the Worcester branch has attained its present success. Robert Wuest, national commissioner, spoke on the general aims and plans of the association, and was followed with an interesting address by Henry A. Carpenter, of A. Carpenter & Sons Foundry Co., Providence, R. I., formerly president of the National Founders Association.

PERSONAL.

Oscar Otto, formerly superintendent of the West Chicago shop of the Chicago & Northwestern railroad, has been made superintendent of the shop of the Westinghouse Machine Co., at East Pittsburg, Pa.

John F. Miller, vice president of the Westinghouse Air Brake Co., has been elected a member of the board of directors to take the place of John Caldwell, treasurer, deceased. R. B. Emory, assistant treasurer for years, was elected treasurer.

W. A. Scantlebury has become connected with the Youngstown Car Mfg. Co., in its New York office, 90 West street. He has had ten years' experience in industrial car work, recently with the Wonham-Magor Car & Mfg. Co.

Patrick J. Lavelle, general manager of the Johnstown plant, of the Lorain Steel Co., for the past nine years, has tendered his resignation to take effect the first of the year. Mr. Lavelle entered the employ of the Johnstown company in 1887 as a machinist, finally rising to the office of vice president and general manager.

C. C. Overmire, formerly with the United States Steel Corporation on the Minnesota iron ranges, has been appointed contracting manager of the Seattle office of the American Bridge Co., vice H. W. Jack, resigned.

OBITUARY.

Walter L. Sandford, Chicago, manager of C. E. Atkins & Co., saw manufacturers, died in Chicago, Dec. 17, aged 55. For a number of years, he was connected with the hardware trade, when a boy having entered the employ of Sargent & Co., New York.

William Maurice Savage, one of Chicago's pioneer iron manufacturers, died there Dec. 17, aged 85. He went to Chicago in 1863 with his brother, Richard Savage, now dead, and founded the firm of Savage Bros., manufacturers of machinery and structural iron.

Robert Gracey, who founded the firm of R. Gracey & Son, Pittsburg, which was subsequently incorporated, died Dec. 12 in that city aged 87. Deceased was at one time a river steamboat man and went from that to steamboat blacksmithing and machinery work.

Thomas J. Morrell, who a number of years ago was in charge of the chemical laboratory of the Cambria Steel Co., at Johnstown, Pa., died in Boston, Dec. 16, aged 68. He was a nephew of the late Daniel J. Morrell, one of the builders of the Cambria Iron Co., and was an authority on the metallurgy of iron and steel.

James Edgar, president of the New York Stamping Co., Brooklyn, N. Y., died Dec. 14 at the age of 68. He was a native of Ireland, but came to this country at an early age and became one of the pioneers in the manufacture of sheet metal specialties. In this field of activity his inventions played an important part.

Frank I. Cordo, superintendent of the review department of finished materials, with the Griffin Wheel Works, Chicago, died, Dec. 20, after a short illness, in his forty-eighth year. For three years previous to last October, he was general purchasing agent for the company. Immediately before becoming a member of the Griffin organization, Mr. Cordo was assistant general manager of the Chicago & Northwestern railroad.

Israel Wistar Morris, pioneer mining engineer, died at his home in Philadelphia, Dec. 18, aged 80 years. He came into prominence for his work in the development of the anthracite fields in Pennsylvania, and took a prominent part in framing tariff bills, not only for the protection of coal, but other American industries. Ten years ago he retired from active management of his railroad and coal interests, devoting his time to scientific and literary pursuits. He was the father of Effingham B. Morris, chairman of the Pennsylvania Steel and the Cambria Steel companies.

Gold Exports Are Threatened

The week on the New York stock exchange was marked by considerable irregularity in prices and by alternating periods of activity and dullness. Sterling exchange advanced above 4.88 for the first time since last July, leading to an expectation of gold exports direct to Europe.

Monday stocks were strong but the trade was considerably curtailed by the storm which cut off telegraphic communication. Amalgamated Copper and Steel common were among the stocks to advance. Western Maryland and Rhode Island made new high records. Tuesday the market was irregular with a tendency to lower prices. From Pittsburg a conference of labor leaders announced an intention to attempt to organize the men in the shops of the United States Steel Corporation. Wednesday the market was weak and lower. United States Steel declined temporarily, the manifesto of the Pittsburg labor conference being used to depress the price. Reading raised its dividend from 2 to 3 per cent semi-annually. On the Pittsburg exchange, Air Brake, Switch and Signal and Crucible Steel made new records for the year. Thursday the rise in sterling exchange began. The market was irregular, but showed little net change in prices at the end of the day. Louisville & Nashville increased its annual rate from 6 to 7 per cent. Friday the market was dull and the range of prices narrow; sterling exchange remained firm. Saturday the market was dull with Pennsylvania and Steel common the strongest features.

Money on call in New York was nominally 5 per cent Saturday. The week's range was from 3 to 5 per cent with 4½ the usual rate.

Bank clearings throughout the United States were estimated at $3,596,669,281, aganst $3,474,594,081 the week before and $3,346,117,508 the corresponding week last year. The actual figures for the clearing house banks showed surplus decreased $3,048,350, loans increased $19,217,100, deposits increased $20,577,000 and the ratio of reserve 25.6 against 25.9 the week before. Trust companies and non-member banks showed loans and investments increased $1,233,100; deposits increased, $5,427,300 and the percentage of reserve 17 against 16.9 the week before.

Exports of gold for the week from New York amounted to $521,500 and the imports were $130,248. **Commercial** failures numbered 286 against 254 the last week and 388 the corresponding week of last year. The liabilities in failures reported for the month up to Dec. 18 amounted to $7,764,795 against $7,611,836 the corresponding week last year. The report of the American Railway Association shows that between Nov. 24 and Dec. 10, 26,845 cars were added to the surplus equipment.

The shares dealt in on the New York exchange for the week numbered 3,751,600 against 4,141,600 the week before, and 5,454,600 the corresponding week last year. The value of bonds other than government bonds dealt in during the week was $25,039,000 against $24,517,000 the week before and $29,822,000 the corresponding week of last year.

THE LEADING INDUSTRIAL SECURITIES.

	Closing Quo. Dec. 18	Changes in week	Date 1909 Ann.M't'g.	Stock Outstanding	Dividend Basis	Dividend Last Declared	Dividend Date Last Div. Pay.
Allis-Chalmers	15⅝	+ ⅛	Sept. 2	$19,820,000		.....	.....
Allis-Chalmers, pr	55	+1¼		16,150,000	7 cum.	1¾ Q.	Feb., 1904
American Can	14¼	— ¼	Feb. 2	41,233,300		.....	.....
American Can, pr	82	.....		41,233,300	7 cum.	1¾ Q.	Jan., 1910
Am. Car & Fdy	72½	+ ½	June 24	30,000,000		½ Q.	Jan., 1910
Am. Car & Fdy., pr	119	.....		30,000,000	7 n. c.	1¾ Q.	Jan., 1910
American Loc	61	— ⅜	Oct. 19	25,000,000	5	1¼ Q.	Aug., 1908
American Loc., pr	114	+1		25,000,000	7 cum.	1¾ Q.	Oct., 1909
American Ship	77	—3⅛	Oct. 13	7,600,000	4	1 Q.	Oct., 1908
American Ship, pr	110¾	.....		7,900,000	7 cum.	1¾ Q.	Sept., 1909
Am. Steel Foundries(new)	65	— ¼	Dec. 2	17,184,000		1¾ Q.	.....
Barney & Smith	40	.....	June 1	2,000,000	4	.....	Sept., 1907
Barney & Smith, pr	115	.....		2,500,000	8 cum.	1 Q.	June, 1908
Bethlehem Steel	34½	— ¼	April 6	14,862,000		.....	.....
Bethlehem Steel, pr	67¾	— ¼		14,908,000	7 n. c.	¾ Q.	Feb., 1907
Cambria Steel	48¼	+1⅜	Mar. 16	45,000,000*	3	¾ Q.	Aug., 1909
Cambria Iron	46½	+ ½		8,468,000*	4	2 S. A.	Sept., 1909
Chicago Pneumatic Tool	38⅞	+1⅜	Feb. 15	6,145,000	4	2 S. A.	Oct., 1907
Colorado Fuel	51½	+ ¼	Oct. 18	34,235,500		1¾ Q.	April, 1902
Crucible Steel	16	+ ⅜	Oct. 20	24,578,400		3½	.....
Crucible Steel, pr	93	—1¼		24,436,000	7 cum.	1¾ Q.	Dec., 1909
Empire Steel	12	.....	April 27	1,254,770		.....	.....
Empire Steel, pr	75	.....		2,500,000	6 cum.	3 S. A.	July, 1909
Fay & Egan	90	.....	Feb. 18	1,000,000	7	3 S. A.	Nov., 1908
Fay & Egan, pr	120	.....		1,000,000	7 cum.	1¾ Q.	Nov., 1909
General Electric	159⅝	—1⅛	May 11	65,179,600	8	2 Q.	Jan., 1910
Harbison-Walker	36	.....	Jan. 18	18,000,000		2 Q.	Oct., 1907
Harbison-Walker, pr	95	.....		9,600,000	6 cum.	1½	Oct., 1909
International Pump	50¾	— ¼	June 8	17,762,500		1 Q.	April, 1903
International Pump, pr	90	— ⅜		11,350,000	6 cum.	1½ Q.	Nov., 1909
Lackawanna Steel	64	+2	Mar. 10	34,978,000		.....	.....
Lake Sup. Corp	27¼	— ¾	Oct. 6	40,000,000		.....	.....
New York Air Brake	96¾	+2¼	June 17	10,000,000	8	2 Q.	Oct., 1907
Niles-Bement-Pond	104	+4	Feb. 3	8,500,000	6	1½ Q.	Dec., 1909
Niles-Bement-Pond, pr	104	+2		2,000,000	6 cum.	1½ Q.	Nov., 1909
Otis Elevator Co	54	.....	Mar. 15	6,375,300	3	1½ S. A.	Oct., 1909
Otis Elevator Co., pr	96	.....		6,295,000	6 n. c.	1½ Q.	Oct., 1909
Pa. Steel	65	.....	May 10	10,750,000		.....	.....
Pa. Steel, pr	116	+1		16,500,000	7 n. c.	3½ S. A.	Nov., 1909
Pittsburg Coal Co	28	+ ¼	Mar. 9	28,104,600		.....	.....
Pittsburg Coal Co., pr	75	+5½		27,071,800	7 cum.	1¾ Q.	April, 1905
Pressed Steel Car	52	— ¾	Feb. 17	12,500,000		1 Q.	Aug., 1904
Pressed Steel Car, pr	105¾	+ ¼		12,500,000	7 n. c.	1¾ Q.	Nov., 1909
Pullman	190	—1	Nov. 10	100,000,000	8	2 Q.	Nov., 1909
Railway Stl. Spring	51¾	+ ¾	Mar. 4	13,500,000	2	1 S. A.	Oct., 1908
Railway Stl. Spring, pr	106½	.....		13,500,000	7 cum.	1¾ Q.	Dec., 1909
Rep. Iron & Steel	46¼	— ¼	Oct. 20	27,191,000		.....	.....
Rep. Iron & Steel, pr	107⅛	+ ⅝		20,416,900	7 cum.	1¾ Q.	Jan., 1910
Sloss-Sheffield	86½	—1½	Mar. 10	10,000,000	5	2 Q. †	Nov., 1909
Sloss-Sheffield, pr	117¾	—1½		6,700,000	7 n. c.	1¾ Q.	Oct., 1909
U. S. Pipe & Fdy. Co	32⅝	+ ⅝	June 23	12,106,300	2	1 Q.	Dec., 1907
U. S. Pipe & Fdy., pr	84	.....		12,106,300	7 n. c.	1¾ Q.	Dec., 1909
U. S. Steel	92½	+1½	April 19	508,302,500	3 n. c.	¾ Q.	Sept., 1909
U. S. Steel, pr	125¼	— ¼		360,281,100	7 cum.	1¾ Q.	Aug., 1909
U. S. Steel, 5s	104⅜	— ⅛		463,398,000	5	.....	.....
Va. Iron, Coal & Coke	71½	— ½	Sept. 21	9,073,680		.....	.....
Westinghouse Elec	82½	—1½	June 16	27,173,200*		1¾ Q.	Oct., 1909
Westinghouse Air Brake	150	.....	Oct. 5	14,000,000*		4 Q.	Oct., 1909

Par value of shares, $100, except those starred (*), $50.
†Includes deferred dividend of ¼ of 1 per cent.

Copper Stocks.

New York.—Amalgamated Copper closed at 88, an advance of 1.

Boston.—Butte Coalition closed at 29 unchanged; Calumet & Arizona closed 101¾, decrease ¼; Calumet & Hecla closed 660, gain 10; North Butte closed 57½, gain 2½; Quincy closed 85, unchanged.

Financial Notes.

The following dividends have been declared: The Otis Elevator Co., regular quarterly dividend of 1½ per cent on the preferred, payable Jan. 15 to stock of record Dec. 31; the Westinghouse Electric & Mfg. Co., regular quarterly dividend of 1¾ per cent, payable Jan. 15; the Westinghouse Air Brake Co., regular quarterly dividend of 2½ per cent, an extra dividend of 1½ per cent, and a special dividend of 1 per cent; the American Locomotive Co., regular quarterly dividend of 1¾ per cent on preferred, payable Jan. 21.

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January	5,506
February	5,346
March	5,396
April	5,508
May	5,533
June	5,551
July	5,572
August	5,597
September	5,609
October	5,628
November	5,634

December 23, 1909.

STEEL QUALITY AND PURITY.

The era of improvement in the quality of steel has only dawned. It is a curious thing that from the time of the first manufacture of Bessemer and open-hearth steel there was no material improvement in quality until recently. Indeed, there have been many who have claimed that steel as furnished to consumers deteriorated in quality. Crucible steel remains the best steel, but it is the oldest of all commercial steels.

Of late there has been a definite trend toward improving the quality of steel, and there is good ground for making the forecast that, if the history of the development of steel manufacture be written 25 or 50 years hence, one of the most distinctive features of the period just commenced and running years into the future will be set down as the development of quality. Hitherto substantially all the progress has been in tonnage and economy of production.

It has become proverbial among students of steel that the more one learns about this material the more he finds he does not know. The time was that the trend of most investigations was along the line of finding out what could be added to steel to make it better, but when one enters the region of binary and ternary alloys, as appears to be necessary, the field of investigation so widens that it seems almost impossible to traverse it, yet the earlier investigations made proved one thing, which was that nothing could be taken for granted; no portion of the field could be considered mapped out because contiguous portions had been explored. The effect of manganese alone showed this, for successive additions to steel showed a progressive and regular change in physical characteristics of the resultant alloy, but when, later on, much larger additions were made, a totally new trend in physical characteristics of the alloy was observed.

It is probably not unfair to make the generalization that one of the greatest practical discoveries of recent times has been that by purifying, rather than by alloying steel, great improvement can be made in quality. There are, it appears, impurities in steel which largely eluded the chemical investigations of the earlier times, but which have a marked deleterious effect upon steel. This may be no new discovery, in a technical sense, but in a commercial sense, having an eye to the commercial adoption of the principle, the statement is defensible that it is new.

Remarkable results are obtained by purifying steel. The so-called titanium rail, for instance, which has shown remarkable wear resisting and other desirable qualities, is not a rail which contains titanium, but one in which the steel has been purified or partly purified by the action of titanium. It is not a titanium rail in the sense that a rail containing nickel is a nickel-steel rail. Remarkable results in resistance to corrosion have been developed in a material which is almost pure iron, containing much less of the metalloids than does ordinary soft steel.

There has been reason to believe that the addition of many of the more familiar alloy metals to steel has improved quality not by what remained in the steel, but by what went out, carrying with it deleterious elements, yet, if one judge by the voluminous papers presented to the various scientific bodies in the past few years, investigation has proceeded chiefly along the lines of what was performed by the material which remained. There has been table after table showing what the steel did when it contained one one-hundredth per cent of the alloy metal, what it did when it contained two one-hundredths per cent, and so on until there was enough material for a table. When a binary alloy is investigated, the material for a table is not as a simple progression, but is as the square of the number of hundredths per cent.

All this may be valuable in its way, but it is eminently more practical to ascertain first what can be done by purifying steel, and that is the direction in which practical investigation is now strongly trending. Without the basis of a pure steel, or at the very least a steel with recognized and understood impurities, the spasmodically obtained empirical data upon alloy steels are of relatively little value. They may possibly be trusted by steel users as far as they can be seen, particularly if confirmed by frequent tests, but they are not a good basis for investigators to use in extending their work.

Remarkable quality was shown by the old fashioned charcoal iron. What appears to have been a fatal error was made in assuming that because the ordinary wrought iron with which it compared was so full of slag and other dirt the new fashioned steel which did not contain that dirt ought of necessity to be as good as the charcoal iron. Purity in steel, it is evident, is not measured by the quantity

of material which is not iron, but by its character.

It may be that the best commercial means of purifying steel will be found to be by the addition of some of the many nostrums which are being studied and, if so, the facts will not be difficult to develop. Along another line in purifying steel important commercial developments are certain, since it will not be long until the electric refining of steel is applied to rail steel at the Gary plant. It is well known what steel ought to do in rails, and it is well known what it does do, so that comparisons can be accepted with confidence. The promise is clearly that much information is going to be contributed in the next few years as to what is the best means of improving the quality of steel at the least additional cost.

THE PIG IRON IMPORT MOVEMENT.

It is from the British returns that we obtain the first statistical evidence of the import movement in ordinary pig iron. The United States statistics thus far published have extended only through October and in them there has been no evidence of a special movement in ordinary pig iron. Indeed, the imports published, which include ferro manganese, spiegeleisen, ferro silicon, etc., showed scarcely any larger movement in August, September and October than the average in the first six months of the year, when our steel works were making much smaller output and therefore were not consuming nearly as large a tonnage of the alloy forms.

The British returns of pig iron exports to the United States just at hand cover the month of November, and are thus, allowing for time of shipment, fully a month and a half ahead of the latest returns of the United States. They may be summarized as follows:

BRITISH PIG IRON EXPORTS TO UNITED STATES, GROSS TONS.

January to June	54,202
July	10,751
August	8,049
September	9,987
October	15,662
November	32,832
Eleven months	131,483

The monthly exports during the first six months of the year averaged 9,000 tons, presumably confined almost exclusively to ferro-manganese, spiegeleisen and ferro-silicon. The next three months showed an average of 9,600 tons per month, but the gain of between 6 and 7 per cent may easily be attributed to increased consumption of the alloy metals. October showed a sharp increase, and November a still sharper one, and it is no trick to identify the increase as confined almost exclusively to ordinary grades of pig iron, sent to the United States for consumption along the seaboards, principally the Atlantic, between 5,000 and 6,000 tons in October and between 22,000 and 23,000 tons in November.

The change in the character of the pig iron covered by the statistics in October and November as compared with the preceding nine months may be observed by a comparison of values. The 82,989 tons exported to the United States in the first nine months of the year were valued at $515,079, or $30.20 per ton. The 48,494 tons in October and November were valued at £234,946, or $23.57 per ton. As values of ferro-manganese, spiegeleisen, etc., advanced rather than declined, the great decline in average value is confirmatory evidence, although such is far from being needed, of the injection of a large tonnage of ordinary pig iron into the movement. A rough computation, assuming that of the total of 48,494 tons in October and November, 20,000 tons were of special material at the average valuation of the preceding nine months, indicates that the remaining iron was valued at considerably under $20 per ton.

The movement thus far is by no means comparable with that in 1906-7, since some single months in that period showed more than 50,000 tons of ordinary pig iron.

British pig iron exports to the United States in calendar years have been as follows:

	Gross tons.
1904	56,027
1905	173,889
1906	310,699
1907	434,989
1908	70,323
1909*	131,483

*Eleven months.

There has been considerable matter in the daily press dispatches about large transactions in German material, whether spiegeleisen or some other form was not made clear. Inquiry in trade circles failed to confirm most of the reports circulated and it is well to note that circumstances are not such as to send buyers to Germany rather than to England. This fact may be observed by comparing our import figures with the English export figures and noting the small gap. Imports of all grades of pig iron into the United States have been as follows:

January to June	58,901
July	17,899
August	10,422
September	12,601
October	11,851
Ten months	111,674

As the British exports in October appeared largely as imports into the United States in November, a comparison should be made with the nine months through September only. In that period the United Kingdom exported 83,000 tons of pig iron to the United States, while in the same period the United States imported 100,000 tons of pig iron. Approximately, then, 83 per cent of our pig iron imports have been coming from the United Kingdom.

PUDDLERS' WAGES

In Middle England Unchanged by Wages Board's Return.

The Midland wages board return for the two months ending September and October has been issued and, as in the Northern districts, the result is to leave wages unchanged.

The net average selling price was £6 3s 9d as compared with £6 2s 9d the previous two months. This shows a very steady condition of things, proving also that the recovery, so far as it affects prices, is still very slight. Bars have recovered 1s in price, angles and tees 4s 3d, plates and sheets 2s 3d, while hoops, strip and miscellaneous are lowered by about 1d per ton. The total output of the seventeen selected firms has increased from 31,492 tons to 37,332 tons.

Puddlers' wages continue at 8s 6d per ton compared with 8s in the north of England, which is considered the correct relationship, the Midland men having the customary 6d in lieu of northern extras. Unless some decided improvement takes place, the present prices probably represent those obtaining until the end of the year. The present state of things makes any selling increase impossible.

THE WEEK IN IRON CENTERS

PITTSBURG

Active State of Trade in Mill and Forging Machinery.

Office of THE IRON TRADE REVIEW,
510 Park Building, Dec. 21.

Machinery builders whose business is intimately associated with that of the iron and steel industry report the outlook in rolling mills and cranes has never been better. This condition has arisen from the many figures of capacity extensions already announced as in contemplation by various iron and steel makers.

A very active state of trade is also to be rated in forging machinery in which the steel makers and the automobile manufacturers are figuring prominently. There is an increased demand from the mills for forging equipment to reinforce blooming mill operations while the heavy market for automobiles in prospect for the coming season and the efforts being bent toward increased efficiency in construction parts, is bringing out many orders for new equipment. The tendency of the automobile trade is in the direction of larger capacity forging machinery than has heretofore been used. Some makers of forging machinery are so sold up that they are not promising any deliveries on large capacity equipment in less than four months.

The Page Woven Wire Fence Co., Worcester, Pa., has decided upon the making of several improvements to its plant, principal among which will be a large warehouse, 200 x 200 feet in dimensions. The new structure will be used especially for the storing of wire fencing. The company will also proceed at once to increase its scrap and pig iron handling facilities and will install a 5-ton traveling crane with a 300 foot runway, electric magnet, etc.

The Republic Iron & Steel Co. is considering large equipment awards in connection with the construction of the new steel works, blooming, billet and sheet bar mills at Lansingville, near Youngstown, O. This is one of the most important active rolling mill projects now before equipment builders. The award of the steel construction works the past week indicates the stage to which this improvement has advanced.

The Westinghouse Machine Co. announces that it is regularly booking a large amount of business estimated to aggregate about $500,000 monthly. In the East Pittsburg shops of the company there are now under construction, 100 steam turbines ranging from 1,000 to 8,000 horsepower, 25 Le Blanc condensers and gas engines with a total horsepower of 18,300.

CLEVELAND.

Number of Concerns Report Increase in Business.

Office of THE IRON TRADE REVIEW,
Browning Building, Dec. 21.

The Taylor & Boggis Foundry Co. notes an increase over 1908 of about 50 per cent with a bright outlook for the next 12 months.

The business of the Standard Welding Co. has doubled in the past year. This concern looks for a continuation of the present high level of its business for the next two years.

The Acme Machinery Co. advises that its business has increased appreciably during the last few months and that its prospects for the coming year are of the brightest.

The Dayton Globe Iron Works Co., Dayton, O., advises that it has on its books at the present time, approximately six month's business, this in itself precluding the possibility of any slackness in 1910 for this concern.

The American Steel & Wire Co. has applied for a permit to build an emergency hospital at its local plant. The building will be two stories high and will contain a complete hospital equipment on a small scale. The estimated cost of the new building is $8,000.

The Burke Machinery Co., whose plans for removal were noted in these columns a short time ago, advises that it will commence operations in its new plant at Conneaut, O., about the first of the year. The company has erected a brick building, two stories high and basement, 146 x 57 feet in size. This concern does not contemplate any immediate additions to its present equipment, but will add several new tools to the line it is now manufacturing, among which are a combined facing and boring mill and a small size floor milling machine in both rack and power feed.

The J. D. Smith Foundry Supply Co., has made contracts with the Packard Motor Co., Detroit, for two batteries of core ovens, a battery of natural draft brass furnaces, and two oil burning aluminum furnaces; with the Gisholt Machine Co., Madison, Wis., for four large core ovens and three rolling drawer core ovens. Besides this, it has just completed a battery of rolling drawer core ovens for the Manufacturers' Foundry Co., Waterbury, Conn., also for the Western Foundry Co., Chicago. This concern advises further that it is about to place a new design of aluminum furnace for either oil or gas, on the market by the first of the year.

The C. O. Bartlett & Snow Co. reports the following recent sales: Farmers Lime & Fertilizer Co., Canton, O., one complete lime and stone crushing plant to be erected at its works at Howellstein, O.; Canfield Oil Co., Cleveland, complete outfit for manufacturing paint; National Carbon Co., Cleveland, elevators and conveyors for its Fostoria plant; Walker-Stratman Co., Pittsburg, steam dryer and machinery for burning pulverized coal; Pennsylvania Salt Mfg. Co., Philadelphia, elevating machinery; Portage Silica Co., Youngstown, O., machinery for disintegrating and grading gravel. This concern further advises that the large coal handling plants which it is erecting for the McGillivray Creek Coal & Coke Co., Coleman, Alberta, and the West Canadian Colleries, Blairmore, Alberta, are very nearly completed, and will be in operation about the first of the year.

The Ferry Cap & Set Screw Co. has recently completed the construction of an addition to its plant, 140 x 150 feet in size. Previous to installing new machinery, a dance was given by the company for its employes, last Friday evening. All new equipment has been contracted for.

The Cleveland Steel Casting Co., which has been conducted as an incorporated company, has been changed to a partnership and the proprietors are W. W. and George W. Balkwill. The concern will be known as Cleveland Steel Casting Co., and it will have no connection with the Cleveland Frog & Crossing Co., as it formerly had. It is understood that the business will be carried on with no change of policy.

NEW YORK.

Approach of Holidays Brings Inactivity to Machine Tool Trade.

Office of THE IRON TRADE REVIEW,
Room 1005, No. 90 West St., Dec. 28.

Local machine tool interests report business during the past week as considerably more quiet than for some time past, explaining the absence of important buying as the usual quiet incident to the holiday period and the approach of inventory time. The closing of some fairly large lists early in the month, in connection with a very gen-

erous volume of scattered business, will make a creditable showing for December, however, and the trade will enter the new year with conditions sound and indicative of record activities. Some further buying has been done by the International Steam Pump Co., and orders aggregating a large figure have been distributed by the American Locomotive Co., for its automobile plant at Providence, R. I., thus adding materially to the machine tool purchases of this interest during the year. An important meeting of supply and machinery dealers was held at the Machinery Club during the week for the purpose of discussing matters of common interest.

The Wonham-Magor Car & Mfg. Co., which heretofore has had its offices with Wonham, Magor & Sanger, is now located at Room 1467, No. 50 Church street. No accurate estimate has yet been secured as to the damage caused by the recent fire at its industrial car works, Athenia, N. J., but arrangements are being made to rebuild the plant, in which connection considerable equipment will be required. Basil Magor is president of the company, C. W. Hanford secretary-treasurer and F. S. Wonham, vice president.

Bids have been opened by the Board of Water Supply for constructing the Grassy Sprain aqueduct and Platt avenue syphon sections of the Catskill system, extending some three and one-half miles through Yonkers and Greenburg. The tunnel is to be of concrete, 17½ feet high and 18 feet wide, of the cut-and-cover type and three and one half years are allowed for its completion. The Elmore & Hamilton Contracting Co. is low bidder, at $1,485,150. Another section of this work, the Hillview reservoir, was let to the Millard Construction Co., recently, and a third section, the Kensico reservoir, will be closed shortly, probably at a cost of about $6,000,000. Extremely heavy expenditure for contractors' supplies, excavating and conveying equipment, will follow.

The Enterprise Mfg. Co., Philadelphia, has decided upon the erection of a $500,000 plant at Cornwells, a suburb, on the Pennsylvania Railroad and connecting with the Delaware river by canal. The plans call for a foundry building 120 x 500 feet, and three other buildings, to be located on a tract of 80 acres recently acquired. This concern is now located at Third and Dauphin streets.

Contracts have been awarded for a 10-story addition 86 x 147 feet, to the plant of the Curtis Publishing Co., Philadelphia, to be occupied for mechanical purposes. W. J. Doyle & Co., will erect the building.

A brisk demand for industrial cars is noted, principally from scattered sources, but including several large inquiries. The United Fruit Co. is in the market for a number of cars for export, and an Arizona mining interest is about to close on 150 steel cars of heavy type.

Alfred Box & Co., Philadelphia, have recently closed a number of important crane contracts for the foundry trade. Box cranes will be employed in the extension of the Midvale Steel Co., Nicetown, Pa., of the Seaboard Steel Casting Co., Chester, Pa., and of the Pennsylvania Steel Casting Co., also of Chester. The Atha Casting Co., Newark, N. J., has ordered a Box crane and some extremely large inquiries for foundry work are now under negotiation.

The New Haven Mfg. Co., New Haven, Conn., manufacturer of machine tools, advises relative to its general business conditions that they are gradually attaining a normal state, and that the company's outlook for the coming year is very favorable.

CINCINNATI

Manufacturers Add to Equipment Anticipating Continued Demand.

Office of THE IRON TRADE REVIEW, First National Bank Bldk., Dec. 21.

The last month of the year finds the manufacturers busy in the manufacture of machine tools, engines and boilers. The outlook for the new year is encouraging and the inquiry under consideration furnishes a basis for expectation of the continuance of orders. A decided improvement has taken place in the call for engines and a number of new installations have been ordered during the past two weeks. The lighter lines of machine tools are enjoying a continued good demand and the makers of light lathes are practically all behind on orders. The shops are increasing output by new purchases of machinery and machine tools and there is an incessant demand for good operatives with the supply of desirable help short of the demand. In the heavy lines of machines the demand is somewhat intermittent but is gradually enlarging so that manufacturers of planers and other heavy types are receiving enough business to keep the shops employed.

The I. & E. Greenwald Co. during the past week has received orders from the Proctor & Gamble Co., for two 400 horsepower engines and is now installing one of 400 horsepower for the A. Sander Packing Co. The same company secured the order for the entire power plant of the Victor Lamp Co., calling for a 250 to 300 horsepower engine, boilers, heaters, pumps, etc. This company has several other good orders from other sections and is figuring on considerable business. The company is also busy in its gear cutting department.

The Cincinnati Pulley Machinery Co. is installing two new lathes and a planer and has just completed the installation of a new planer and a grinding machine. The company is busy on orders for upright drills and has shipped a number of its pulley lathes in the recent past. This concern recently moved to a new building in Covington, where it is more than doubling its previous capacity.

The Cincinnati Lathe & Tool Co. notes a continued steady call for its light lathes and is behind on orders.

The Cincinnati Bickford Co. is enjoying a good demand for drills and notes a tendency toward a broadening in demand as inquiries are coming from all sources.

The Champion Tool Works Co. continues to enjoy a good run of orders for lathes.

As an evidence in the demand for portable drills one of the leading manufacturers in this line reports that it is now using every available space of shop room in its plant and feels the necessity of seeking larger quarters as the only means of increasing its output to properly supply the calls for its machines.

BUFFALO.

Public Works Will Call for Large Amount of Equipment.

Office of THE IRON TRADE REVIEW, 932 Ellicott Square, Dec. 21.

Machinery makers of all leading lines are more crowded than at any other time and the only embarrassment they complain of is lack of ability to get out the orders for early delivery. Buyers are pressing the makers very hard for machinery ordered on specifications. But the accumulations of business make it impossible to deliver as desired. In many cases two shifts have been ordered at the shops to help out the buyer who is waiting for equipment. The prospect for orders, so numerous for many weeks, may be fairly said to have increased substantially. The call for mechanical equipment cannot be otherwise than very strong for some time at least. There are numerous prospective new industries in western New York and specifi-

cations on a number of these which are of interest to the iron, steel and machinery trade will soon be out.

Foundries here make a comparatively fine showing in business done and orders on hand. Several of the larger interests of this class which operated for many months with an output much below normal are now running overtime and are behind on delivery. One thing that the customer finds today in placing business with the foundries is that in many instances specifications calling for small castings are figured very reluctantly and often only to accommodate, the pressure of business making this necessary.

Ten large-type engines have been ordered by the Buffalo & Susquehanna Railroad. They will be built by the American Locomotive Co., and the total weight of each will be 188,000 pounds. The design is much the same as those now used by this line. The diameter of cylinders is 21 inches; stroke of piston, 28 inches; diameter of boiler, 74¼ inches; length of firebox, 107 inches; total heating surface, 2,676 square feet.

The city of Buffalo will let a contract for the installation of a 12-inch high pressure fire pipe line and conduit through various streets. The contract will include valves and hydrants. Waterworks systems, complete with pumping plants are to be constructed at Irondequoit, N. Y., and Keeseville, N. Y. In Batavia, N. Y., a sewage pumping system will be put in and a sewage disposal plant at Gloversville, N. Y.

A steel bridge will be built by the state of New York over the Erie canal at Georgia street, Buffalo. A reinforced concrete bridge 513 feet long over the Genesee river, Central avenue, Rochester, N. Y., is projected. The plans for this structure are being prepared at the present time by the city engineer of Rochester. It is estimated the bridge will cost $150,000.

The Central Dock & Terminal Railroad Co., has been formed at Buffalo with authorized capital stock of $500,000. The directors are Buffalo and New York men.

The state of New York having decided to spend $7,000,000 in improving the Seneca and Cayuga canals, there will be a market for a considerable amount of dredging equipment.

The Augustine Automatic Rotary Engine Co., which recently purchased the plant of the American Leatherette Co., this city, is now moving a part of the machinery from the old plant at Northampton street, and a large amount of new machinery, to the new plant. The American Leatherette plant was built two years ago.

A number of important dredging and Erie canal improvement contracts which will develop a market for dredging and excavating machinery in central New York have been let by the superintendent of public works of New York state.

It is expected that contracts for constructing the various buildings of the Beaver Mfg. Co.'s plant at Buffalo will be let about Jan. 15. The Beaver Mfg. Co. makes interior finishings. Its new plant will consist of administration buildings, 80 x 80; factory, 100 x 280; two warehouses, 60 x 250, and 60 x 420; power house, 40 x 40; generating plant, 30 x 40; indurating plant, 40 x 40. The new plant will be modern in every detail. The buildings will be of reinforced concrete, fireproof constructions.

MILWAUKEE.

Holiday Vacations to Be Shortened—New Plants Operating.

Milwaukee, Wis., Dec. 21.—It is more than probable that the usual holiday vacations granted to employes of machinery plants in this district will this year be considerably curtailed, in order to prevent congestion as much as possible.

Several important changes in the management of the Power & Mining Machinery Co., of Cudahy, Wis., have just gone into effect. Arthur Niedermeyer, manager of the works, has been transferred to another plant of the International Steam Pump Co., located at Buffalo, N. Y. John D. Bird, until now manager of the Henry R. Worthington Co., of Harrison, N. J., becomes general manager of the Power & Mining plant at Cudahy. He was formerly superintendent of the gas engine department of the Fairbanks-Morse Mfg. Co., at Beloit, Wis. Twenty-two members of Mr. Bird's New Jersey office force have been transferred to Cudahy, insuring a harmonious and organized start for the new regime. It is reported that the Cudahy works, already the main western branch of the International, will be enlarged considerably during the next year.

A gas producer engine using any kind of coal, from low grade bituminous screenings up, has been invented by Carl O. Nordessen, an engineer of the Fairbanks-Morse Mfg. Co., at Beloit, Wis. A working model of the engine has been in daily operation in this plant for six weeks, mainly for experimental work, and has delivered 250 horsepower without a slip, although the poorest kind of coal that could be found has been used.

The Southern Wisconsin Foundry Co., Madison Square, Madison, Wis., has declared a dividend of 5 per cent, the second within six months' time. At the same time a handsome amount was turned into the reserve. The plant has been in operation only a little more than a year, but has built up a large business. It furnishes all castings for the Northern Electrical Mfg. Co. and Steinle Turret Machine Co., of Madison, as well as for several gas engine manufacturers in Milwaukee. H. M. Vance is secretary, treasurer and business manager of the company; H. A. Knade, vice president, is superinttendent of the works.

The Manitowoc (Wis.) Brass & Foundry Co. on Dec. 16 began to operate its foundry at Tenth and York streets, Manitowoc. Henry Stahl is superintendent, and associated in the company are Dave Balkansky, Abraham Schwartz and Mr. Stahl. The company is the outgrowth of the Manitowoc Iron & Metal Co., a large scrap firm.

The new foundry of the Mandt Wagon Co., at Stoughton, Wis., will be ready on Feb. 1. The building will cost $16,000 and equipment about $7,500. The foundry is built on the filled river bed of the Yahara river, which was moved from its course to make room. Twenty concrete piers were built and the building rests on reinforced concrete beams resting on the piers. The foundry has dimensions of 200 x 50 feet. Adjoining it is a two-story structure, 23 x 30 feet. This contains an electric elevator to carry iron to the charging room. A cinder mill is being installed in the cupola room and operated by electric motors. The buildings are of steel and concrete fireproof construction.

The Optenberg Iron Works, Sheboygan Falls, Wis., is rushed with contracts, among them being: for J. M. Kohler Sons Co., Sheboygan, smoke breechings for new power plant, weight 30,000 pounds; boilers for Zimmermann Bro's rendering plant, Sheboygan; boilers for tug Hope, Port Washington, and for fog horn station on Beaver island; 25,000 gallon tank for American Hide & Leather Co., Sheboygan. The iron works has designed a new portable pneumatic plant of 15 horsepower, for use on board ship when necessary to rivet, drill or do other work of this kind.

MAXIMUM TARIFF

Is Causing Some Anxiety to Congress and the Administration.

Office of THE IRON TRADE REVIEW,
Post Bldg., Washington, D. C., Dec. 20.

Two matters promising to engage no small part of the attention of Congress during the session relate to the maximum and minimum tariff and the plans made by President Taft and Secretary Knox for perfecting a reorganization of those branches of the administrative service that have to do with the development of foreign trade.

The maximum tariff question is exceedingly troublesome to the leaders of the Republican majority in congress. The fact that Representative Mann of Chicago has put in a measure proposing to extend the time for the maximum tariff going into effect causes uneasiness among the leaders because it is recognized that the situation may become acute so far as our trade with Canada is concerned. General attention is being focused upon our northern neighbor due to the manifest disposition of the government of the Dominion to allow the higher tariff of the United States to go into effect, if President Taft shall so decide, without offering the slightest objection thereto.

On the other hand, the attitude of the president, as set forth in his message to congress, and in his conversation with visitors at the White House, is that there is no reason for apprehension among American exporters of commodities that anything like a tariff war will result from these differences over our customs duties, or the various provisions of foreign tariffs affecting our sales in foreign markets.

This view of the matter is not satisfactory to Mr. Mann, or others who agree with him in the belief that unless something is done to prevent it, there will be unfortunate conditions arising between the United States and Canada over their trade relations.

In the matter of the active efforts of President Taft and Secretary Knox to infuse a little life into the bureaus and divisions of the state department having to do with trade affairs, the initial movement for the session of congress was the presentation of a detailed plan to carry forward the recommendations made in the closing days of the last congress for greatly increasing the efficiency of the department by enlarging and strengthening the Bureau of Foreign Trade Relations and the divisions having to do with trade in the Orient and in South America.

Senators and representatives who are keeping track of the drift of things in connection with foreign trade are greatly pleased with the interest displayed by the administration in these affairs. Whether it will be possible to secure any change in the date for the application of the maximum tariff depends upon what chances there may be to secure an agreement that the bringing up of this matter would not have the effect to open up a discussion of general tariff matters, and efforts to secure other changes in the law.

REINFORCED CONCRETE USED IN MANY WESTERN BUILDINGS.

Prospects are unusually bright for the commencement of work on a large number of class A buildings in Seattle and vincinity soon after the first of the year. No great amount of structural steel will be used, however. Out of nine buildings in Seattle and Portland, none of which are to be less than three stories while six are over five stories in height, only three will be steel frame structures, the others being reinforced concrete.

One 8-story steel building will be erected in Portland, Ore., at the corner of Fifth and Alder streets. Doyle & Patterson are architects. The same architects are preparing plans for a 15-story steel frame building to be erected by the Ganian Estate, Portland.

Construction work has commenced on a 7-story steel frame building at 1917 First Ave., Seattle. Bids for the steel work on the new Monto Cristo Hotel, Seattle, will soon be called for by J. O. Taft, architect, Seattle.

The number of re-inforced concrete buildings being erected on the north Pacific coast is significent and is having a pronounced effect upon the tonnage of structural steel being consumed in the northwest. In Seattle alone, exclusive of smaller structures, plans for the erection of four large concrete buildings were announced last week. One of these will be nine stories and the others six, five and four stories in height respectively. If steel frames had been adopted, over 6.000 tons of structural steel would have been utilized. As the plans are made, no steel, aside from the relatively insignificant amount consumed in the form of reinforcing bars, will be used.

The Sloss-Sheffield Steel & Iron Co. reports profits from operations for the quarter ending Nov. 30, of 374,036. The surplus available for dividends is $307,736, which compares with $428,835 in 1908 and $334,065 in 1907.

OVER A HUNDRED LIVES

And Thirty Vessels Lost During the Season Just Closed.

Thirty vessels passed out of existence on the great lakes during 1909. Among these vessels were the steamers Aurania, Russia, J. B. Cowle, Clarion, and Marquette & Bessemer No. 2. Three vessels were abandoned as constructive total losses, the James H. Hoyt, Henry Steinbrenner and W. C. Richardson, though it is probable that the underwriters will be able to raise them. Altogether 109 lives were lost.

The crew of the package freighter Wissahickon, which is ashore on Outer Duck Island, has been taken off. The steamer is in a dangerously exposed position and is being constantly pounded by the seas. She may become a total loss.

The Anchor Line has given a contract to the Detroit Ship Building Co. for a steamer to replace the Clarion which was burned on Lake Erie on Dec. 9. The new steamer will be a duplicate of the Conemaugh.

The passenger steamer Alabama, building for the Goodrich Transportation Co., of Chicago, was launched from the shipyard of the Manitowoc Dry Dock Co., Manitowoc, Wis., on Saturday last.

NOVA SCOTIA STEEL PAYS STOCK BONUS.

Directors of the Nova Scotia Steel & Coal Co., Ltd., at a special meeting held at New Glasgow, N. S., have been authorized to increase the company's capital stock by $1,000,000, and to pay a stock bonus of 20 per cent to shareholders. Referring to the resolution authorizing the above action, President R. E. Harris said that the position of the company, as to finances, material resources and future prospects was never so good as at the present time.

JONES & LAUGHLIN PURCHASE.

The Jones & Laughlin Steel Co. has purchased a plot of ground adjoining its new office building in Ross street, Pittsburg, for a consideration of $34,530. The property has a frontage of 49 feet and will be held for future improvements.

The Crucible Steel Co. of America reports for the quarter ending Nov. 30: Net profits, $1,701,793, compared with $402,988 in the corresponding period last year, an increase of $668,805.

ELECTRIC REVERSING ROLLING MILL AT THE RHEINISCHE STEEL WORKS*

By G. Meyer.

When it became necessary, in 1907, to replace an old rolling mill engine driving the 44-inch reversing mill at the Rheinische Steel Works, Duisburg, it was decided to employ electric power, there being sufficient space at the opposite end of the mill to erect the motor

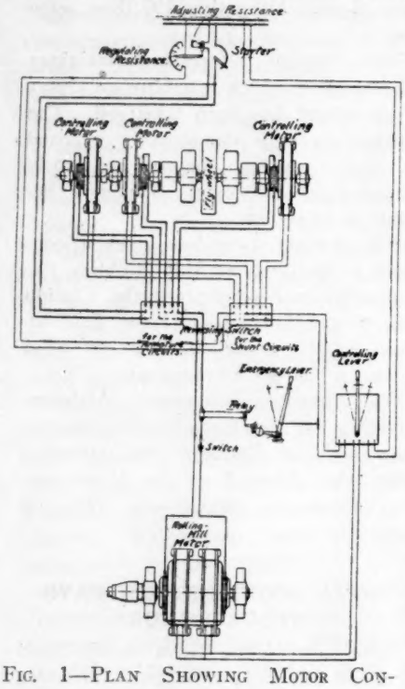


Fig. 1—Plan Showing Motor Connections.

without stopping the mill. At that time there was only one electrically operated reversing mill at work, namely, at the Hildegarde Works, in Austria, a second, at the Georgsmarien-Hütte, being in course of construction; it was, therefore, a momentous decision to settle upon electric driving for the only roughing mill in a works with an output of about 450,000 tons per annum.

Arrangement Based on Ilgner System.

The arrangement adopted for connecting up the motor is shown in Fig. 1, which requires little explanation. It is based on the Ilgner system, continuous current at 525 volts being supplied from the powerhouse, transformed by means of the Ilgner set into variable voltage between zero and plus or minus 1,300 volts, and conducted thence to the duplex shunt-wound motor driving the mill. The regulation of the latter between zero and plus or minus 40 revolutions per minute was effected by means of a Leonard connection altering the excitation of the two controlling dynamos in the Ilgner set, and between plus or minus 40 and plus or minus 60 revolutions by weakening the field of the mill motor. The excitation of the dynamo is suspended automatically, by means of a maximum relay, in the event of the current exceeding a certain amperage; the relay can also be operated by hand. Throw-over switches enable any of the three equal dynamos in the Ilgner set to be used as a motor or as a regulating dynamo. The flywheel prevents the fluctuations of the motor load from re-acting on the feeder circuit; and suitable provision is made for a uniform supply of current to the motor, in spite of the fluctuating speed under the influence of the rotating masses.

Motor Arrangement.

The arrangement of the motor with regard to the mill is shown in Fig. 3. The cast steel hubs of the two armatures are screwed together by means of a split centering ring, to secure effective transmission of the high moments of rotation from one armature to the other. Two shaft stumps are fixed into the armature hubs, the provision of a through shaft being impracticable owing to transport difficulties. These shafts run in ring-lubricated, water-cooled bearings, supported by a heavy four-part base plate. The motor is almost completely encased, to prevent access of dust and moisture, and to facilitate artificial ventilation, the cooling air being forced in by fans from a conduit in the foundation. This ventilation enabled the external dimensions of the motor and the moment of rotation of the armature to be kept small, thus facilitating the rapid reversal of the mill. Owing to lack of space for a new helicoid-pinion housing, the motor is coupled direct to the lower roll, and the upper roll is driven by the old pinion gearing at the further end of the mill.

The motor is enclosed in a sheet-iron shed, just large enough to allow convenient access to all parts, and lighted by glow lamps. This shed can be removed by the crane, when the motor has to be exposed for repairs. The motor switchboard is housed in a small extension of the shed. Although the space between the mill and the shearing machine rollers is only about 45 feet, the motor (weighing 200 tons) was put into position without hindering the work of the mill. By Sept. 15, 1908, everything was ready to disconnect the steam engine and couple up the motor, since which time the latter has taken over the whole task of operating the mill, without interruption.

Controlling Mechanism.

The position of the controlling platform is shown in Fig. 3. The main controlling lever is on the driver's right hand. This lever regulates the excitation of the regulating dynamo, which in turn governs the speed of the mill motor. Pushing forward the lever results in the forward running of the mill, and vice-versa, the excitation current of the regulating dynamo being reversed when the lever reaches its central position. At the same time a braking action is set up, the motor acting as a dynamo, and supplying energy to the flywheel through the

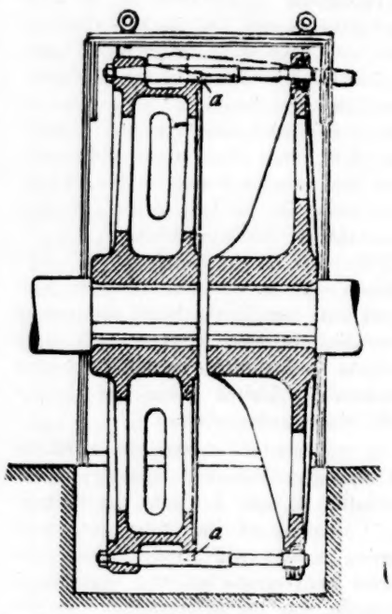


Fig. 2—Method of Coupling Flywheel to Motors.

regulating dynamo. The magnetic inertia of the latter is rendered harmless by exciting it with high tension current (with the interposition of suitable resistances). In this way the mill can be reversed up to 20 times per minute. At the same time a considerable

*Reprint from *Stahl und Eisen.*

saving of energy is effected, the driver being able to shut off the current immediately the ingot has issued from the mill; whereas, if the magnetic inertia remained undiminished, the lever would have to be drawn over too far, thus producing the risk of a sufficient rise in the amperage to cause the safety fuses to act and stop the work of rolling.

An emergency lever on the driver's left hand serves to cut off the excitation of the controlling dynamo in the event of the main regulator failing to act. This emergency switch operates a maximum relay, which is arranged in a cellar some distance away. The knowledge that he will have a certain amount of trouble in re-setting this relay before the motor can be started again, is calculated to make the driver more careful in his work.

In front of the driver's stand are mounted voltage and amperage meters for the motor armature circuit, and an electrical indicator of the number of revolutions made by the mill, a red lamp being automatically lighted when the speed falls below a certain minimum. To save energy by weakening the excitation of the motor during prolonged pauses, a foot lever is provided which has to be kept pressed down to maintain the excitation at full power, but reduces the latter when released.

The modified Ilgner set is mounted

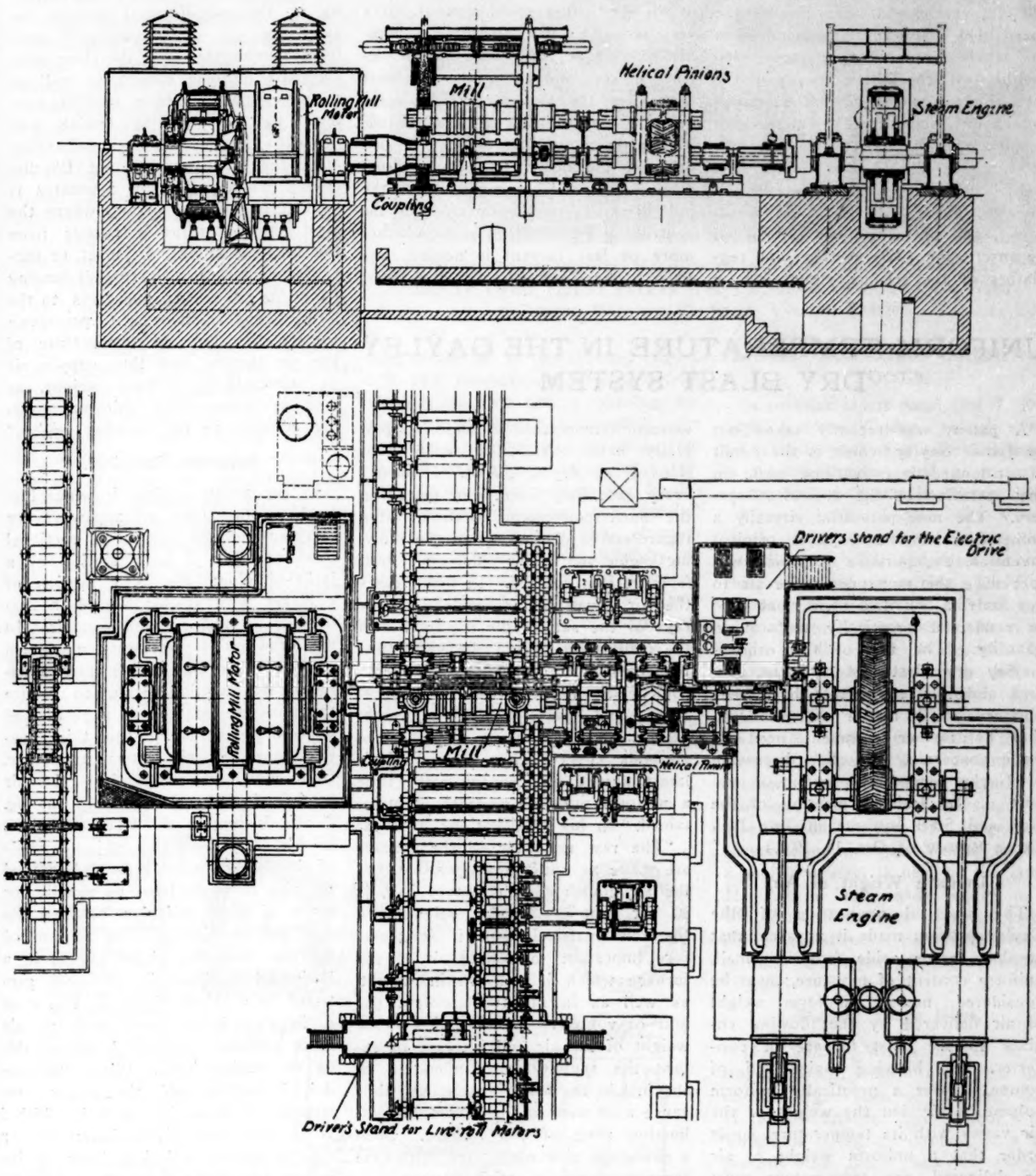


FIG. 3—SECTIONAL ELEVATION AND PLAN OF ELECTRIC REVERSING ROLLING MILL AT THE RHEINISCHE STEEL WORKS.

in the power house, about 200 yards from the mill. The two controlling dynamos are mounted on either side of the 38-ton flywheel, and the controlling motor is rigidly coupled to one of them. The peripheral velocity of the flywheel varies between 330 and 270 feet per second, according to the speed (440—360 revolutions), and when the set is running empty (speed 460 revolutions), the kinetic energy of the total rotating mass is 200,000 electrical horsepower-seconds. The method of coupling the flywheel to the dynamos is shown in Fig. 2, the flexible steel rods being capable of transmitting a force of about 8,500 electrical horsepower, and of being readily detached by unscrewing. The switches and regulators of the set are mounted in a small chamber close by. A metallic starter is used, the resistances being immersed in an oil bath, maintained in circulation by a small pump and cooled by water. The regulator for maintaining a constant intake of current by the controlling motor, in spite of the fluctuating speed, consists of a very sensitive relay, operating a number of switches in the excitation circuit of the motor on the slightest change in the amperage. The same result is assisted by a compound winding on the motor that can be switched off when the motor is used as a dynamo. A system of signals from the mill driver keeps the operator of the controlling set informed as to whether more or less current is needed, and when to start and stop the apparatus.

UNIFORM TEMPERATURE IN THE GAYLEY DRY BLAST SYSTEM

A patent was recently taken out by James Gayley which is the result of prolonged investigations made in the operation of the dry blast system. The new patent is virtually a completion of Mr. Gayley's original invention, the purpose of which was to reduce the moisture in the air to not only a small content, but also to render it practically uniform in quantity. The use of the original Gayley dry blast system is so general, and the results that have been obtained are a matter of record, so that no further comment need be made concerning it. (See discussion of Gayley dry blast system in report of the London meeting of the Iron and Steel Institute in THE IRON TRADE REVIEW of Oct. 14, 1909.)

Uniform Weight of Air.

The practical application of the Gayley process made it apparent that another factor aside from a small, uniform content of moisture, must be considered, namely, uniform weight of air delivered by the blowing engines to the blast furnace or converter. The blowing engine will, of course, deliver a practically uniform volume of air, but the weight of the air varies with its temperature, so in order that a uniform weight of air be delivered, the temperature must be kept constant. A variation of about 4 per cent in the weight of air results from a difference of 20 degrees Fahr. In other words, this means a variation of about 150 pounds per minute in the weight of air supplied to a large, modern blast furnace.

The importance of the factor of uniform temperature of blast has generally been overlooked in installations of air drying plants. In nearly every case they have been placed in the most convenient location, often regardless of distance from the blowing engine and of the influence of heat from various sources. In many cases the air pipes are subjected to the rays of the sun in the daytime, with the result that during the night time the blast is from 10 to 20 degrees cooler. Such fluctuations in temperature, and consequently in weight of air, are done away with by the methods covered by Mr. Gayley's latest patent, and at the same time a uniform moisture content is maintained. In his specifications he says:

"The raw materials of the furnace are made as uniform as possible, but the air consumed per ton of iron is 50 per cent greater by weight than the raw material; and it is therefore important to deliver air to the furnace which is uniform in weight, as well as in moisture content per unit of volume. The variation in the weight of the air will increase or retard the rapidity of combustion of the fuel in the blast furnace, and thus cause a change in the fusion or combustion zone of the furnace. Such a change in this zone often causes the furnace charge to stick or hang on the walls, and these hanging portions, when dislodged, cool off the furnace hearth and interfere with the uniformity of furnace operation and the grade of metal produced. These disturbances I have found to exist independently of the percentage of moisture in the air, since air of varying temperatures can, and often does, contain the same quantity of moisture. Air of varying temperatures, however, cannot contain the same weight per unit of volume; and the purpose of my present invention is to secure better uniformity in the metallurgical process by supplying air of substantially uniform temperature and therefore substantially uniform weight, as well as of substantially uniform moisture content, to the blowing engine, and hence to the furnace, or metallurgical apparatus. In carrying out this discovery when air-drying apparatus is applied to existing plants, where the air-drying apparatus is remote from the blowing engine, I jacket or otherwise protect the air conduit leading from the air-drying apparatus to the blowing engine, in order to preserve a substantially uniform temperature of the air therein, and thus supply air of substantially uniform weight, as well as substantially uniform moisture content, to the blowing engine."

Apparatus Required.

In the accompanying drawings, Fig. 1 shows one form of apparatus for carrying out the method in sectional elevation; Fig. 2 is a section of a jacketed pipe; Fig. 3, a section of a jacket with shield; Fig. 4, a section of an underground conduit. In the drawings *b* represents a portion of the air-drying refrigerating apparatus, its function being to reduce the moisture content to a small and uniform percentage. From this apparatus the dry air enters a pipe *c*, from which it passes into the air conduit *d*, jacketed as shown in Fig. 2, and leading to the blowing engines. In Fig. 2, *f* represents a jacket made of insulating material formed around the pipe so as to leave an annular air space of about 6 inches between the pipe and the jacket. Any portion of the pipe extending above ground in a horizontal position is perfectly protected by a shield, shown in Fig. 3 as *g*, its roof being double with an air space between. Brackets *h* support this on the conduit itself. Where the conduit is underground, the proper construction is shown in Fig. 4, in which *i* is an outer wall, *j* the inner wall or conduit proper, and *k* a layer of insulating material between the two walls. The pipe leading from the blowing engines to the blast furnace or converter is represented at *m*, the cylinders of the blowing engine being represented by *l*. The arrangement shown is merely suggested, however, as any suitable means for delivering the air at a uniform temperature may be used.

The claims of the patents, which are five in number, are as follows:

1. The method of operating blast furnaces or converters using an air blast, consisting in reducing the moisture content of the air to a small and substantially uniform percentage, supplying the dried air at a substantially uniform temperature and weight to blowing engines, and then forcing this air to the furnace or point of use; substantially as described.

2. The method of obtaining uniformity in the operation of blast furnaces and converters, consisting in supplying thereto air of a small and substantially uniform moisture content, and of a substantially uniform temperature and weight.

3. The method of supplying air to blast furnaces and converters, consisting in reducing the air to a low and substantially uniform temperature, reducing its moisture content to a small and substantially uniform percentage, maintaining the air thus treated at a substantially uniform temperature as it passes to the blowing engines, and then forcing said air to the blast furnace or converter.

4. In air supply apparatus for blast furnaces or converters, a refrigerating chamber, arranged to reduce the air to a low and substantially uniform temperature, and to a low substantially uniform moisture content, a blowing engine between the refrigerating chamber and the blast furnace or converter, and a conduit connecting the refrigerating chamber and the blowing engine and arranged to maintain a substantially uniform temperature of the air at the blowing engine.

5. The combination with a refrigerating chamber and a blowing engine, of a conduit connecting the same, and a conduit extending from the blowing engine to a blast furnace or converter, and means for insulating or protecting the conduit between the refrigerating chamber and the blowing engine, whereby air of a substantially uniform temperature and weight, as well as of a substantially uniform low moisture content, is supplied to the blowing engine.

New York copper exports from Dec. 1 to Dec. 15, inclusive, were 10,496 tons.

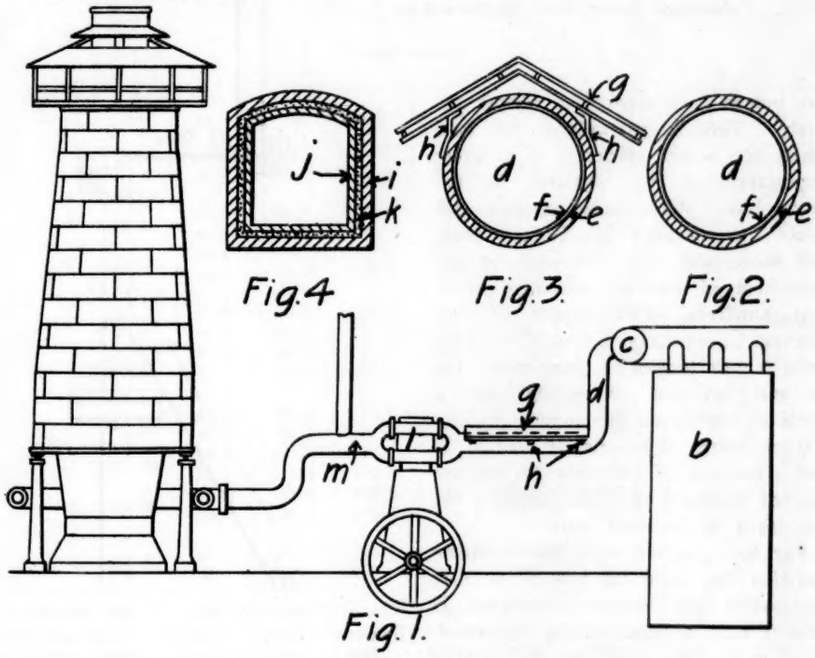
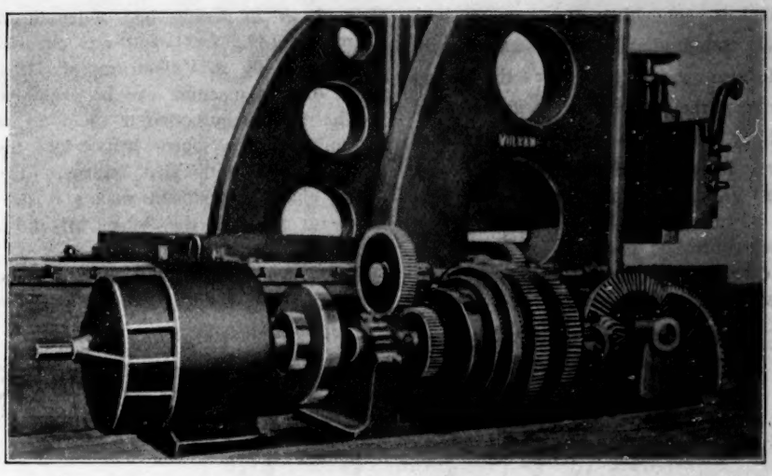


Diagram of Equipment for Gayley Dry Blast System.



Heavy Motor-Driven Planing Machine With Three Cutting Speeds and Quick Return, Under Test at Vulkan Works. Showing Driving Gear With Electro-Magnetic Clutches, Vulkan Patent.

LARGE AUSTRIAN MACHIINE TOOLS.

In consular report dated Dec. 7, 1909, Capt. Godfrey Carden, special agent, referring to machine tool building works in Austria-Hungary, and in particular to the Vulkan Works in Vienna, says:

I was informed that the Vulkan Works undertake to build no less than 200 different types and sizes of machine tools and accessories. The Huré Works in Paris build 152 different types of machines, and, as mentioned in the report on the Huré Works, this fact of having to build so many different designs of machines was strongly deprecated by Mr. Huré. He would much prefer to confine his efforts to the building of two or three designs only, but owing to their limited territory he was compelled to take advantage of every available order. To judge from conversation with the Vulkan officials, a similar opinion is held by the latter. Mr. Ast, in reply to an inquiry as to what line of machines he would rather confine his attention to, were it possible to limit the types of output, replied, "Planers."

Making Large Sizes.

The Vulkan Works appear to be making special efforts along the lines of the larger sizes of machine tools. If there is any one type of tool which Vulkan is laying stress upon, it is apparently the larger size of planers. The firm does not hesitate to go in for large dimensions and undertakes to build planers ranging in width of table up to 4 meters (13.12 feet). Vulkan has actually made planers up to 5½ meters (18 feet) width. This special size was built for ironworks and was designed for handling heavy armor plates. These latter planers are de-

signed to cut either one way or both ways, longitudinally and transversely, and also vertically. For the heavy planers three or four speeds are supplied and at least two speeds are always given when an electro-clutch is used. The Vulkan establishment emphasizes the advantage of the electrically driven clutch-controlled planer. The firm builds its own motors, which are adapted for slow speed and several rates of speed. One planer in service had a length of 15 meters (49.2 feet) and was electrically driven by a Vulkan motor. The speed of this machine can be regulated at the tool in proportion of 1 to 6. There are two open belts for the cutting speed with step pulleys. The electro-clutch attachment makes it possible to advance the table by millimeter degrees if so desired.

The Vulkan Works were making some very fine large-sized radial drills. These machines resemble very closely a well known American type, and, are universal in operation. Several of these Vulkan radial drills were in process of building, having arm lengths of 2½ meters (7.6 feet). One very early receives the impression on visiting the Vulkan Works that these shops are confining their attention largely to the building of large-sized tools especially adapted for locomotive works and similar machinery plants.

LINE SHAFT EFFICIENCY, MECHANICAL AND ECONOMIC*

By Henry Hess.†

The efficiency to be treated in this paper is that of the line shaft considered as an element for the transmission of power. The complete power transmission system is made up of the shaft and pulleys; the belts, ropes or other equivalents; and the journals supporting all of these.

The difference between the power delivered to the system and that delivered by it is consumed in the work of bending and slipping the belts and overcoming the friction of the journals. There may be another loss due to the bending of badly aligned shafting; but as misalignment should not occur and as the remedy is obvious, it will not be considered further. The power lost in the bending of the belts and in their slipping or creeping is but a small fraction of the total loss, and one, moreover, that cannot be materially lessened; assuming, of course, that belts are kept properly pliable and not allowed to dry out, become caked with dust or stiffened with adhesive dopes, all causes of loss of belt efficiency that no good shopman will allow to exist.

There remains the journal friction. In the average plant this accounts for nine-tenths or even more of the entire line shaft losses. Included in the journal friction are the losses at the loose pulley bearings and the countershafts. The coefficient of friction of plain babbitted or of cast iron bearings ranges all the way from ½ to 1 per cent to 8 per cent. This range covers all of the many methods of lubrication in general use. The better value is rarely realized outside of the laboratory; the poorer value is by no means as rarely found as it should be. A showing of 3 per cent friction coefficient is one that the manager may well pride himself on; while a coefficient of 5 per cent is much more general, but need not, as conditions are, be taken as reflecting adversely on attention to details.

The remedy obviously lies in the substitution of ball bearings for plain bearings. In other fields than line shafting this remedy finds considerable employment; in some, the plain bearing has indeed been superseded almost entirely. This is particularly the case where the power efficiency is of great importance, as for instance, in the automobile. While some shopmen still doubt the reliability of the ball bearing, those who have followed the development of modern machinery know that hundreds of thousands of ball bearings are carrying loads varying from a few ounces to many tons, day in and day out, at speeds ranging from a few turns per minute to 10,000 or more. They realize that it is not a question of reliability *per se*, but one of selection of sizes suitable for the loads to be dealt with.

For line shafting it is the economic question that is to the fore. The first cost of a ball bearing installation is greater than a plain bearing equipment. Will it pay for itself by the savings effected and if so at what rate? What return on the difference in investment can be realized? That there is a saving is generally known, but accurate figures are wanted by which a manager can justify his recommendation to those who control the purse strings and are responsible for dividends.

When only the idle running of the shafts is considered, answers to these

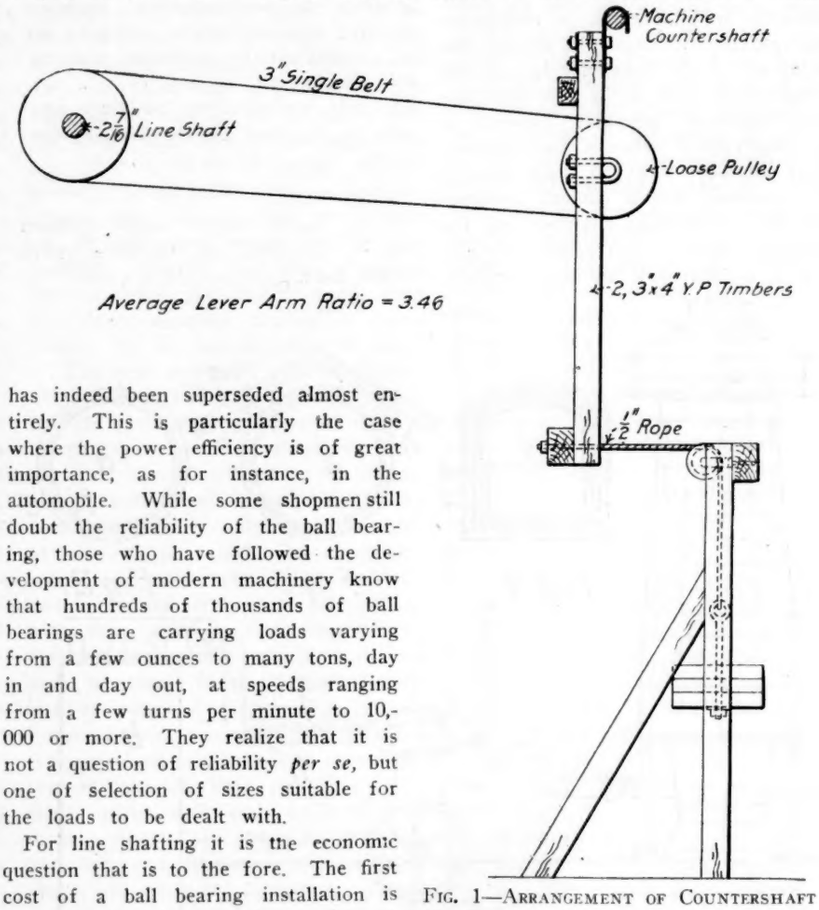


Fig. 1—Arrangement of Countershaft Frames Used During Comparative Tests of Ball and Ring-Oiling Bearings.

*From proceedings of A. S. M. E., December, 1909.
†Philadelphia.

questions can be easily obtained, now that electric motors are so generally applied directly to line shafts and it is so simple a matter to take readings of the power delivered to them. The difference in readings for the same shafts with plain and with ball bearings represents fairly accurately the saving for the idle run.

But line shafts are not put up to run idly; they drive machines and these machines are sometimes heavily loaded, sometimes lightly loaded and sometimes idle. While comparative current readings taken under these conditions may be fully satisfactory to those immediately concerned, this rather crude method cannot lay claim to that accuracy which is more and more being demanded by the engineering world.

Plan of Tests.

To supply definite information the author decided that a series of comparative tests should be made, involving no variables other than the bearings themselves. In order further to eliminate possible personal bias in favor of the ball bearings the author called on Messrs. Dodge and Day to make these tests, giving them carte blanche as to methods, with instructions confined to a demand for definite and reliable figures. This investigation is the first undertaken, so far as the au-

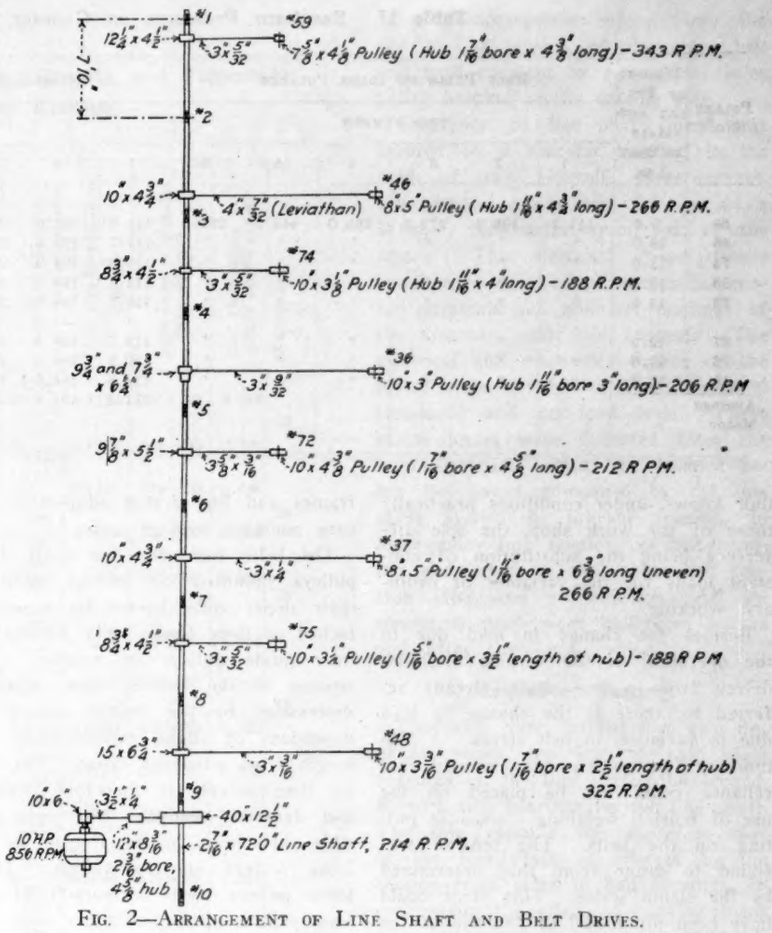

#1
#59
12¼"x4½" 3"x5/32 7⅝"x4⅛" Pulley (Hub 1 7/16" bore x 4⅜" long) - 343 R.P.M.
10'0"
#2
10"x4¾" #46
4"x7/32 (Leviathan) 8"x5" Pulley (Hub 1 11/16" x 4¾" long) - 266 R.P.M.
#3
8¾"x4½" #74
3"x5/32 10"x3⅛" Pulley (Hub 1 11/16" x 4" long) - 188 R.P.M.
#4
9¾" and 7¾" x 6¼" #36
3"x9/32 10"x3" Pulley (Hub 1 11/16" bore 3" long) - 206 R.P.M.
#5
9⅞"x5½" #72
3⅝"x3/16 10"x4⅜" Pulley (1 7/16" bore x 4⅝" long) - 212 R.P.M.
#6
10"x4¾" #37
3"x¼ 8"x5" Pulley (1 11/16" bore x 6⅜" long uneven) 266 R.P.M.
#7
8¾"x4½" #75
3"x5/32 10"x3¼" Pulley (1⅝" bore x 3½" length of hub) - 188 R.P.M.
#8
15"x6¾" #48
3"x3/16 10"x3 3/16" Pulley (1 7/16" bore x 2½" length of hub) 322 R.P.M.
#9
10"x6" 3½"x¼" 40"x12½"
10 H.P. 850 R.P.M.
12"x8 3/16"
2 7/16" x 72'0" Line Shaft, 214 R.P.M.
2⅞" bore, 4⅝" hub
#10

FIG. 2—ARRANGEMENT OF LINE SHAFT AND BELT DRIVES.

Table I. Resultant Pressures on Line Shaft Bearings.

Bearing No.	Line Shaft Dead Loads at Bearings Lbs.	Components of Belt Loads at Bearings (Lbs.) — Test Number						Resultant Loads at Bearings (Lbs.) — Test Number						Belt Number Corresponding to Bearing Loads
		1	2	3	4	5	6	1	2	3	4	5	6	
1	80.33	87 5	153.6	219.1	284.8	350 4	416 5	126	181.5	241 5	303.3	367.5	433	59
2	132.63	23.7 41.8	41.6 73.5	59.4 104.7	77 2 136.0	95.1 167.8	113.0 199.0	150.5	183.5	219	258	304 5	347.5	59 46
3	180 17	39.4 48.6	121.7 85.3	173.8 121.6	226.0 158.0	277.7 195.0	330.5 231.0	222.5	282.5	358	436	520	604	46 74
4	220 57	62.6 65.3	109.9 114.6	156.9 163.7	204.0 212.8	250.5 261.5	298.5 315.5	261	324 5	402	480	567	662	74 36
5	182 16	45.9 63.1	80.6 110.7	114.8 158.2	149.2 205.5	184.0 252.8	214.0 301 0	218	273.5	340	406	488	567	36 72
6	190.09	48.1 52.7	84.5 92.5	120.3 132.0	156.5 171.7	192.7 211.2	228 5 250 5	221 5	268	324 5	390	456	523	72 37
7	201.83	58.5 63.7	102.7 111.8	146.5 159.7	190.5 207.5	234 3 255.0	279 0 303.7	245	305 5	380.5	460	545	635.5	37 75
8	183.96	47.5 52.7	83.4 92.5	118.8 132.0	154.5 171.5	190.5 211.0	225 8 250 5	215	262	321	385	452	520	75 48
9	317.14	58.5 260	102.7 260	146.5 260	190.5 260	234.5 260	279 0 260	505	496	490	489	492	500	48 Motor Belt
10	138.71	60	60	60	60	60	60	185	185	185	185	185	185	Motor Belt
Total	1828.00	1210	1882	2548	3216	3884	4556	2350	2762	3262	3793	4377	4977	

Table II. Resultant Pressures on Counter Shaft Idlers.

Pulley No.	Weight of Pulley and Half of Belt Lbs.	Belt Pulls on Idler Pulleys — Test Number 1	2	3	4	5	6	Resultant Pressures on Idlers — Test Number 1	2	3	4	5	6	R.P.M. of Idlers	Angles of Inclination of Belt From Horizontal
59	9.6	111.2	195.2	278.5	362.0	445.5	529 5	111.0	194.5	277.0	360.8	444.2	528.0	343	5° 38′
46	19.0	"	"	"	"	"	"	111.7	195.5	278.0	361.6	445.0	528.5	266	1° 16′
74	11.6	"	"	"	"	"	"	110.8	194.2	277.3	360.5	444.5	527.5	188	6° 41′
36	13.8	"	"	"	"	"	"	111.7	195.5	278.0	361 8	445.0	528.5	206	1° 55′
72	14.9	"	"	"	"	"	"	110.7	194.0	277.0	360.5	444.0	527.0	212	6° 51′
37	12.2	"	"	"	"	"	"	111.7	195.5	278.1	361.8	445.0	528.5	266	2° 0′
75	11.6	"	"	"	"	"	"	110.8	194.2	277.3	360.5	444.5	527.5	188	6° 30′
48	13.2	"	"	"	"	"	"	111.8	195.6	278.2	361.7	445.2	529 0	322	1° 16′
Average Motor								111.3	194.9	277.6	361.2	444.7	528.1		136° 0′0″

thor knows, under conditions practically those of the work shop, the sole difference being the substitution of constant loads for the variables of ordinary working.

Besides the change in load due to the operation of the various machines driven from a line shaft, already referred to, there is the change in load due to variation in belt stress. A preliminary test quickly demonstrated that reliance could not be placed on the use of tension weighing clamps in putting on the belts. The tension was found to differ from that determined by the clamp scales. This error could have been minimized by the use of the admirable methods and apparatus worked up by the engineers under our past president, Fred. W. Taylor, and this plan was given serious consideration until it was found that the influence of varying humidity and temperature in the shop was such as greatly to change the tension of the belts even after they were in place.

The complete plan finally decided on and carried through was as follows: A line shaft of 2 7/16-inch diameter and 72 feet length used to operate a series of heavy turret lathes was set aside for the test. This was alternately equipped with plain ring-oiled babbitted boxes and Hess-Bright ball bearings. In order to facilitate the exchange of bearings, the ball bearing boxes were placed on the shaft close to the hangers, making it necessary only to slip the plain bearings out of the hanger and slip the ball bearings in. Both types were held by the same supporting screws usual with modern hangers. It is perhaps needless to mention that great care was exercised in seeing that the shaft was correctly aligned at the beginning of each test. It was supported by ten hangers, with an average spacing of 8 feet. Fig. 1 shows the arrangement of countershaft frames and Fig. 2 that adopted to secure constant load.

The belts from the line shaft drive pulleys mounted on swings hung at their upper ends, loaded by ropes attached to their lower ends, which lead over guide pulleys to weights. The tension in the belt is thus definitely determined by the weight and is independent of slight variations of belt length from whatever cause. The load on the journals is therefore constant and definitely known. The only possible variable is in the friction of the loose pulleys on the swings. These loose pulleys were ordinary tight pulleys picked up around the shop and arranged for oiling through the set screw holes and by the addition of channels. The friction was kept as near the constant as possible by oiling at the beginning of every test. This answered fairly well except for two tests in which the rather small dimensions of the hubs gave rise to heating under the abnormally high belt tensions used. Of such swings eight were employed; all were mounted on the same side of the shaft to avoid any uncertainty in load conditions that might have resulted from a possible balancing of pull from opposite sides.

Speeds and dimensions of shafts, pulleys, loose pulleys and loose pulley hubs, belts and belt material are marked in Fig. 1. The drive was supplied

Table III. Average Electrical Readin gs for Each Test.

Test No.	Date 1908	Total Resultant Loads on Lineshaft Bearings Lbs.	Ave. Resultant Pressures on Idlers Lbs.	Total Kw. Taken from Line	Supply Pressure Volts	Ave. Armature Current Amperes	Ave. Field Current Amperes
1A	2/4	2349 5	111 3	1 375	111.0	10.43	1.96
1B	2/6			1.302	109.6	10.1	1.79
2A	2/4	2762	194 9	1.560	109.5	12.3	1.92
2B	2/6			1.372	109.5	10.75	1.78
3A	2/4	3261 5	277.6	1 842	109.6	14.9	1.95
3B	2/6			1.516	110.0	12.0	1.82
4A	2/4	3792 5	361 2	2.051	108.6	17.1	1.82
4B	2/6			1 653	110.0	13.25	1.81
5A	2/4	4377	444.7	2 098	110.5	17.1	1.91
5B	2/7			1 802	109.4	14.7	1.81
6A	2/4	4977	528.1	2 238	109.9	18.4	1.92
6B	2/7			1.933	110 0	15.8	1.78
7A	2/1	2000	0	0 479	110.0	4.00	0.366
7B	2/6			0 381	103.0	3.33	0.381
8A	2/4	2070	0	1 107	111 0	8 00	1.98
8B	2/7			0 955	110 0	6 75	1.93

Tests 7A and 7B made with 1-h.p. motor. All other tests made with 10-h.p. motor. Motor, 856 r.p.m. Line shaft 214 r.p.m.

Table IV.

Electrical Readings, New Power in Kilowatts, and Percentage of Saving Due to Ball Bearings.

Test No.	Total Kw. Taken from Line	Ave. Line Volts × Ave. Field Current = Ave. Field Watts	Watts Delivered to Armature	Armature and Brush Resistance Loss	Armature and Brush Drop	Load + Iron Loss at Apx. Speed	E.M.F. at 856 R.P.M. / E.M.F. in Experiment × Load and Motor Iron Loss (856 R.P.M.)	Iron Loss + Pulley Bearing Loss	Kw. Delivered to Belt at 856 R.P.M.	% Saving
1A	1.375	111.0×1.96=217	1158	11	1.0	1147	$\times\frac{106.6}{110}=1112$	586+60	0.466	
1B	1.302	109.6×1.79=196	1106	10	1.0	1096	$\times\frac{100.7}{108.6}=1016$	554+60	0.402	14
2A	1.560	109.5×1.92=210	1350	15	1 2	1335	$\times\frac{105.2}{108.3}=1297$	579+60	0.660	
2B	1.372	109.5×1 78=195	1177	12	1.2	1165	$\times\frac{100.4}{108.4}=1079$	552+60	0.467	29
3A	1.842	109.6×1 95=214	1628	22	1 5	1606	$\times\frac{106.3}{108.1}=1579$	585+60	0.934	
3B	1.516	110 ×1.82=200	1316	14	1.2	1302	$\times\frac{101.8}{108.8}=1218$	560+60	0.598	36
4A	2.051	108.6×1.82=198	1853	29	1 7	1824	$\times\frac{101.8}{106.9}=1737$	560+60	1.117	
4B	1.653	110 ×1 81=199	1454	18	1.3	1436	$\times\frac{101.4}{108.7}=1340$	558+60	0.722	35
5A	2.098	110.5×1.91=211	1887	29	1.7	1858	$\times\frac{104.9}{108.8}=1791$	557+60	1.154	
5B	1.802	109.4×1.81=198	1604	22	1.5	1582	$\times\frac{101.4}{107.9}=1487$	558+60	0.869	25
6A	2.238	109.9×1 92=211	2027	34	1.8	1993	$\times\frac{105.2}{108.1}=1940$	579+60	1.301	
6B	1.933	110 ×1.78=196	1737	25	1.6	1712	$\times\frac{100.4}{108.4}=1586$	552+60	0.974	25
7A	0.479	110 ×0.366= 40	439	48	12.0	391	$\times\frac{92.5}{98}=369$	76+25	0.268	
7B	0.381	103 ×0.381= 39	343	34	10.1	309	$\times\frac{95.4}{92.9}=317$	81+25	0.211	21
8A	1.107	111 ×1.98=220	887	6	0.8	881	$\times\frac{107.3}{110.2}=858$	590+60	0.208	
8B	0.955	110 ×1.93×212	743	5	0.7	738	$\times\frac{105.6}{109.3}=713$	581+60	0.072	65

Supplement to Table IV.

For 10 H. P. motor: armature resistance = 0.04 ohms, and brush contact resistance = 0.05 ohms to 0.06 ohms (2.5 square inch) for current densities not greater than 7.5 amperes per square inch; hence drop in armature and brush contact = 0.1 ohms × armature current, also loss in armature resistance and brush contact resistance = 0.1 ohms × (armature current).[2]

Iron loss = 5.5 amperes × e. m. f.

E. m. f. with 1.6 amperes in field = $(94-0.5)\frac{856}{850}=94.2$; with 2.0 field amperes $=(108-0.5)\frac{856}{852}=108$.

E. m. f. with any field current at 856 revolutions per minute $=94.2+13.8\times\frac{\text{field current}-1.6}{0.4}$.

For 1 horsepower motor (tests *7A* and *7B*: armature resistance = 2.5 ohms, and brush contact resistance = 0.85 ohm

$$\left(\frac{5}{16}\text{ sq. in.}\times\frac{1}{2},\right)$$

only half of brush in contact; drop in brush contact for 4 amperes (*7A*) = 2 volts, and for 3.33 amperes (*7B*) = 1.8 volts.

Iron loss $=\left(0.80+0.1\times\frac{\text{field current}-0.35}{0.7}\right)$ e. m. f.

E. m. f. with 0.35 amperes in field $=(95-0.8\times3.35)\frac{856}{884}=89.4$ volts; with 0.42 field current $-(109-3.1)\frac{856}{880}=103$ volts.

E. m. f. with any field current $=89.4+13.6\times\frac{\text{field current}-0.35}{0.7}$.

by a 10-horsepower motor from the floor. The tension of the main belt was kept constant by a weighted idler pulley bearing on its driving side.

Constancy of line shaft speed was assured by a rheostat inserted in the field of the 110-volt, direct-current, shunt-wound motor and the use of a Warner tachometer connected to the motor. The electrical measurements taken were the voltage across the motor terminals and ammeter readings of the armature and field currents. The electrical and mechanical losses of the motor were determined from electrical resistance and no load tests. These motor losses were deducted from the total electrical output, the balance being the power consumed by the line shaft system in journal friction, in loose-pulley hub friction, in belt bending and creep, in the motor belt tension idler and in windage. All instruments used were calibrated before and after the tests.

Method of Testing.

The tests were divided into two duplicate series, the first, *A* with plain bearings on the line shaft; the second, *B*, with ball bearings on the line shaft. The sole variable was therefore that of the line shaft as affected by the change from plain to ball bearings. In each series the effect of varying loads was determined by changing the belt tension by approximately equal increments from 20 to 90 pounds per inch width of single belt. This was supplemented by a test with all of the belts removed except the driving belt from the motor, leaving only the weight of shaft and pulleys for journal loads. Each test lasted 40 minutes of running time; a reading of the various instruments was taken every 2 minutes. That means a total of 10 hours 40 minutes with a total of 960 recorded readings.

The loads on the line shaft journals ranged from 126 to 662 pounds per journal; for the 2 7/16 inches by 10 inches ring-oiling babbitted bearings, this gives loads ranging from 5.2 pounds to 27.3 pounds per square inch of projected area. For the ball bearings used, each of which had 12 balls of 9/16 inches diameter, the load per ball was from 10.5 pounds to 55.2 pounds.

It is pertinent to mention that these bearings have so far a record of nearly 5 years constant service under loads corresponding to about three-fourths of the maximum cited and show no evidence of wear. In that period they were lubricated but three times, once when put up, once for the test and once incidental to a shop moving.

Results Shown by the Tables.

Details of the loading of the shaft bearings and of the swing or countershaft idlers are given in Tables I and II. Table III gives the averaged electrical readings for each test. Table IV gives electrical readings with the power in kilowatts delivered to the belt and the percentage of saving due to the ball bearings. In the supplement to Table IV is explained the derivations of the columns in Table IV in reference to the deduction of motor losses from total input.

Table IV, last column, shows that the saving due to changing 10 2 7/16 inch plain ring-oiling babbitted bearings running at 214 revolutions per minute to the ball bearings increases with increasing belt tensions from 14 per cent to 36 per cent. With the more usual belt tensions of good practice ranging from 44 pounds to 57 pounds per inch width of single belt (tests 3 and 4), the saving amounts to 36 per cent and 35 per cent.

Discussion of Results.

Tests 5 and 6 with belt tensions of 70 pounds and 83 pounds per inch width of single belt show lower savings of only 25 per cent. This falling off is due to the fact that the pressures were too high for the loose pulley hub-bearing surfaces, causing excessive heating and losses. This reduction of 25 per cent does not indicate a smaller actual saving due to the ball bearings, but simply that the increase was due to improper excessive friction in the loose pulley hubs, particularly during the "B" runs. The pressure on the smallest countershaft pulley bearing surface during these tests, Nos. 5 and 6, rose to 124 pounds and 148 pounds per square inch of projected area, respectively, which are excessive values.

Tests 7 and 8 were with all the belts off and the line shaft journals consequently sustaining only the weight of the shaft and pulleys and the pull of the one driving belt. The great discrepancy between a saving of 21 per cent and 65 per cent for apparently similar conditions needs explanation. Test 7 was made with a small 1-horsepower motor; for test 8 the same 10-horsepower motor used for the other tests was employed. On subsequent examination it was found that the small motor bearings were badly in need of oil and quite hot. A no load reading of this motor showed 250 watts, which dropped to 100 watts after oiling, a difference of 0.15 kilowatts. Deducting this from the readings of 0.268 and 0.211 gives 0.118 and 0.061, the latter representing a saving of 52 per cent which compares reasonably well with test 8.

Derivation of Constants for Use in Estimating Losses.

While the conditions of loading in this series of tests certainly include those of general practice and it may thus be safely inferred that the savings here shown may be generally realized, it is still desirable to derive constants that may be applied to any set of conditions. The losses incurred are: Line shaft journal friction; countershaft journal friction; belt slip and resistance to bending; belt and pulley windage. The last two may be safely neglected as not being a serious percentage of the total power losses under the average shop conditions although they may become a serious percentage under very light loads. For good ball bearings the coefficient of friction is known to be close to 0.0015. For plain bearings the coefficient of friction may be taken at an average value of 0.03 under good conditions. For plain countershaft bearings the coefficient of friction may also be taken at an average value of 0.03 under good conditions.

Under the conditions of this test the countershaft bearings were replaced by the hubs of loose pulleys on the swings. With the very primitive oiling conditions and the rather high pressures the coefficient of friction here may be safely taken as high as 0.08.

Let L = load in pounds.
d = shaft diameter in inches.
S = shaft speed in revolutions per minute.
$\mu_p = 0.03$ = coefficient of friction for plain ring oiling bearings.
$\mu_1 = 0.08$ = coefficient of friction for loose pulley bearings.
$\mu_b = 0.0015$ coefficient of friction for ball bearings.
Kw. = power consumed in kilowatts.

$$\text{Kw.} = \frac{0.746\ \pi\ d\ L\ S\ \mu}{12 \times 33{,}000}$$

$$= 0.000{,}0059\ L\ d\ s\ \mu$$

and for d = 2-7/16 inch, S = 214; Kw. = 0.00308 $L\mu$.

This works out for the various total loads (Table I) of the six tests:

LINE SHAFT LOSSES IN KILOWATTS.						
Load in pounds	2,350	2,762	3,262	3,793	4,377	4,977
Plain bearings, kilowatt	0.217	0.255	0.301	0.350	0.405	0.460
Ball bearings, kilowatt	0.011	0.013	0.015	0.018	0.020	0.023

The loose pulleys on the countershafts had various diameters and speeds, given in Fig. 1. The sum of the products of these corresponding diameters and speeds is 3,060. For this, kw. = 0.018 $L\mu$. This works out for the various average loads (Table V) of the six tests:

COUNTERSHAFT LOSSES IN KILOWATTS.						
Loads in pounds	111.3	194.9	277.6	361.2	444.7	528.1
Countershaft, kilowatt	0.160	0.280	0.400	0.520	0.640	0.760

Adding these countershaft losses to the plain and then to the ball bearing losses above gives:

TOTAL LOSSES.						
Plain bearings, kilowatt	0.377	0.535	0.701	0.870	1.045	1.220
Ball bearings, kilowatt	0.171	0.293	0.415	0.538	0.660	0.783

Comparison of Actual and Calculated Losses.

In order to make convenient comparisons of these calculated losses with those found by measurement they are tabulated and compared as follows:

COMPARISON OF TOTAL LINE AND COUNTERSHAFT POWER SAVINGS. Tests.	1	2	3	4	5	6
Plain bearings, calculated, kilowatt	0.377	0.535	0.701	0.870	1.045	1.220
Ball bearings, calculated, kilowatt	0.171	0.293	0.415	0.538	0.660	0.783
Calculated savings due to ball bearings, kilowatt	0.206	0.242	0.286	0.332	0.385	0.437
Savings expressed as per cent	55	45	41	38	37	36
Plain bearings, measured, kilowatt	0.466	0.660	0.934	1.117	1.154	1.301
Ball bearings, measured, kilowatt	0.402	0.467	0.598	0.722	0.869	0.974
Measured savings due to ball bearings, kilowatt	0.064	0.193	0.336	0.395	0.285	0.327
Savings expressed as per cent	14	29	36	35	25	25

A comparison of the calculated per cent of saving with the measured per cent of saving as given in the preceding table shows a fair correspondence in tests 3 and 4 but a considerable divergence for tests 1, 2, 5 and 6. Now 1 and 2 are for very light loads and the difference may probably be accounted for as due to the neglected belt resistances and windage. As these are constant and probably independent of the load, they are a large factor for light loads and less so for heavier loads.

Tests 5 and 6 showed abnormal losses in the countershafts, accounted for by serious overheating of the loose pulley hubs.

Tests Under Normal Conditions.

Fortunately tests 3 and 4 were made

under conditions of normal belt tensions of 44 and 57 pounds per inch width of single belt and so indicate that:

a Savings due to the substitution of ball bearings for plain bearings on line shafts may be safely calculated by using 0.0015 as the coefficient of ball bearing friction, 0.03 as the coefficient of line shaft friction, and 0.08 as the coefficient of countershaft friction.

b When the belts from lineshaft to countershaft pull all in one direction and nearly horizontally the saving due to the substitution of ball bearings for plain bearings on the lineshaft may be safely taken as 35 per cent of the bearing friction.

c When ball bearings are used also on the countershafts the saving will be correspondingly greater and may amount to 70 per cent or more of the bearing friction.

d These percentages of savings are percentages of the friction work lost in the plain bearings; they are not percentages of the total power transmitted. The latter percentage will depend upon the ratio of the total power transmitted to that absorbed in the line and countershafts.

e The power consumed in the plain line and countershafts varies, as is well known, from 10 to 60 per cent in different industries and shops. The substitution of ball bearings for plain bearings on the line shaft only, under conditions of paragraph "*a*" will thus result in savings of total power of 35 × 0.10 = 3.5 per cent to 35 × 0.60 = 21 per cent. By using ball bearings on the countershafts, also the saving of total power will be from 70 × 0.10 = 7 per cent to 70 × 0.60 = 42 per cent.

Expenditure Required to Effect Power Saving.

While power saving is of interest and desirable the man responsible for the earning of dividends will want to know what it costs to bring about such power saving and what the investment involved will pay.

A reference to the bearing cost of this test will give the answer.

Ten 2 7/16-inch by 16-inch drop ball bearing hangers, complete cost		$212.60
Ten 2 7/16-inch by 16-inch drop ring oiling hangers, complete cost		84.00
Extra investment		$128.60
Value of saving of 0.395 kilowatt at 3 cents per kilowatt-hour for 3,000 hours per year		$35.50
(Conditions of test No. 4 representing average):		
This saving represents on the extra investment		27 per cent.
A closer calculation, taking into account all of the elements, shows a still better result:		
First cost, plain bearing installation, $84.00.		
Depreciation at 20 years	$ 4.20	
Maintenance:		
Oil, ½ pint per day, at 20 cents per gallon	3.75	
Labor, 2 hours per week, at 20 cents	20.80	
Total		$28.75
First cost ball bearing installation, $212.60.		
Depreciation at 20 years	10.13	
Four per cent interest on first cost difference	5.15	
Maintenance:		
Oil, 1 gallon per year	20	
Labor, 5 hours once per year	1.00	
Total		16.48
Difference		$12.27
Value of power saving of 0.395 kilowatt at 3 cents per kilowatt-hour for 3,000 hours		35.50
Annual saving total		$47.77
Annual saving as return on extra investment of $128.60 =		37 per cent.

THE HEAT TREATMENT OF SPRING STEEL

By Lawford H. Fry.†

The following is an account of a series of tests[1] made at the Baldwin Locomotive Works in 1907, to determine the effect of certain heat treatments on the transverse elastic limit and on the modulus of elasticity of the steel commonly used in America for locomotive carrying springs.

The points under investigation were:

1. The effect of annealing.
2. The comparative effect of quenching in water and in oil.
3. The effect of re-heating the steel to various temperatures after complete cooling in water or in oil.

The steel experimented upon was basic open-hearth spring steel, furnished by the Carnegie Steel Co., and its chemical composition was:

Carbon	1.01 %
Manganese	0.38 %
Phosphorus	0.032%
Sulphur	0.032%
Silicon	0.13 %

The test pieces used were 1 inch in diameter and 14 inches long, with a uniform circular cross section. Ten test pieces were cut from the same bar of steel, stamped with numbers 11 to 20 and treated as indicated in Table 1, which also shows the effect of the treatment on the physical quality of the steel.

Method of Heating and Cooling the Test Pieces.

In the experiments, the temperature at which the specimens were quenched was not varied, as experience has shown that there is a definite temperature for any given steel, size of work and method of quenching, at which the steel should be quenched to obtain the best results. Steel can be hardened by heating it to and quenching it at any temperature equal to or higher than its "critical point," but the higher the temperature at which it is quenched, the coarser becomes the grain and the more brittle the steel. It is therefore desirable to quench the steel close to the critical point,

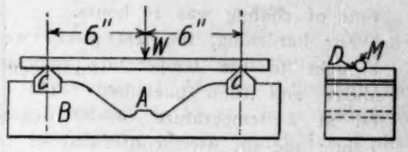


Fig. 1—Test Piece and Support.

but in practice it is found necessary to allow a certain margin above the theoretical hardening temperature. This margin above the critical point is affected by the sizes and shape of the work and the method of quenching. Having been once determined this proper quenching temperature should be always used, any variation in the final degree of hardness being produced by a change in the temperature at which the temper is drawn, or the heat conductivity of the quenching bath.

By means of a magnet the "critical point" or point of recalescence of the steel experimented upon was found to be 1,360 degrees Fahr. Previous experience with the steel has shown that for annealing, the steel should be heated to 40 degrees or 50 degrees above the critical temperature, and that for hardening it should be brought to 50 degrees or 100 degrees above the critical temperature, the exact temperature being determined by the size of the work and the effectiveness of the cooling bath.

For the present investigation the following temperatures were decided upon, they having been indicated by

*Presented before International Association for Testing Materials, at Copenhagen, 1909.
†Paris.
[1]Tests carried out by Francois de St.-Phalle.

previous experience to be the most desirable:

	Degrees Fahr.
For annealing	1,400
For quenching in oil	1,450
For quenching in water	1,425

All the operations were carried out at these temperatures, and the heats at which the temper was drawn and the mode of quenching were the only variables in the heat treatment.

The test pieces were heated in a lead bath specially constructed to secure control and uniformity of temperature. The lead was contained in a cast iron pot placed in a circular brick-lined furnace. Six burners uniformly spaced, admitted a gas-blast at a tangent with the brick walls, so that the flame rotated around the lead bath without impinging upon it at any point. The temperature of the lead bath was registered by means of a Bristol electric pyrometer.

For annealing, the test pieces were plunged in the lead, the bath heated to 1,400 degrees and kept at that heat for two hours, and then allowed to cool off naturally with the furnace, the top of the pot being covered. The time of cooling was 14 hours.

For hardening, the test pieces were brought to the temperature indicated above and then quenched: (1) In oil at a temperature of 80 degrees Fahr.; the oil used conformed to the Baldwin Locomotive Works specification for tempering oil, which requires a fire test of 600 degrees Fahr. or over, and a specific gravity of not less than 25 degrees Baume scale, at 60 degrees Fahr.; or (2) in pure running water at 60 degrees Fahr. The test pieces, while being quenched, were kept agitated until cooled to the temperature of the bath.

For drawing the temper up to 600 degrees Fahr., the test pieces were placed in an oil bath heated by gas, the temperature being registered by means of a mercury thermometer; for drawing the temper above 600 degrees Fahr. the test pieces were placed in the lead bath, the temperature being registered by the Bristol pyrometer. After the temper was drawn to the desired temperature, the test pieces were taken out of the bath and left to cool naturally in the air.

Method of Testing.

All the specimens were tested transversally. They were placed on supports 12 inches apart and the loads applied in the middle. The arrangement of the forged steel base *B* and the tool steel blocks is shown in Fig. 1. The bottom of the base was carefully planed and finished and the tool steel blocks *C*, supporting he specimens, had been scraped to exactly fit the base, so as to allow of no play or deformation when the loads were applied. The top of the tool steel blocks was rounded off at *D*, to the shape of the test pieces, so as to give a good bearing; but even so it was found that the blocks would cut into the test pieces one or two thousandths of an inch, and in order to remove as far as possible any error in the measurement of the deflections due to this cause, the specimens were subjected, before the test was begun, to the repeated application and release of a load which stressed them to about two-thirds of the elastic limit. This load was applied and released often enough to seat the test piece on the supports without giving it a permanent set. When the test piece was seated, the test proper was begun, and the height and deflections of the bars measured at their centers, with an inside micrometer, measuring to 0.00001 inches, one point of which rested in a small center punch hole in the base, shown at *A*. The deflections were increased by steps of 0.0005 inches at a time and the loads measured for each increment of deflection. After having begun a test, the test piece was not released until the test was ended, as this was found to be the most accurate method; there is therefore no record of the permanent sets above the elastic limit.

Results Obtained.

The results obtained are shown in Table 1 and also in the stress-strain diagram in Fig. 2.

The elastic limit is that point where the ratio of deflection to stress ceases to be appreciably constant and the deflection begins to increase at a faster rate than the stress.

The fiber stresses, elastic limit and modulus of elasticity were calculated from the usual formulae for a simple beam, supported at both ends, and loaded at the middle as follows:

$$S = \frac{Wlc}{4I} \quad \ldots\ldots (1)$$

$$f = \frac{Wl^3}{48EI} \quad \ldots\ldots (2)$$

$$E = \frac{Wl^3}{48fI} \quad \ldots\ldots (3)$$

and combining (2) and (3),

$$f = \frac{Sl^2}{12Ec} \quad \text{and}$$

$$E = \frac{Sl^2}{12fc}$$

where,

S = maximum fiber stress in pounds per square inch.

W = load in middle in pounds.

l = span = 12 inches.

I = moment of inertia of cross-section = $\frac{\pi d^4}{64}$ for a round section.

f = deflection in the middle in inches.

E = modulus of elasticity.

c = distance of neutral axis to outermost fibers = $\frac{d}{2}$

d = diameter of test pieces in inches.

Discussion of the Results.

Annealing.—The steel used in the tests, when thoroughly annealed in the manner above described, had an elastic limit of 78,500 pounds. This, as shown below, is equal to about one-half the elastic limit generally obtained with this steel when given a "spring temper," and is equal to about one-third the elastic limit of the same steel when quenched in

Table I. The Heat Treatment of Spring Steel.

No. of tests.	Heat treatment.	Elastic limit.	Modulus of elasticity.	Diam. of test piece.	Moment of inertia.	Brkg. deflection inches.
17	Annealed in lead at 1,400 degrees Fahr.	78,500	27,550,000	0.991	0.04730	Did not break.
11	Hardened in oil at 1,450, drawn to 560 degrees Fahr.	137,500	28,700,000	1.000	0.04909	Did not break.
14	Hardened in oil at 1,450, drawn to 500 degrees Fahr.	160,400	27,150,000	1.000	0.04909	Did not break.
19	Hardened in oil at 1,450, drawn to 400 degrees Fahr.	177,600	29,080,000	0.991	0.04730	Did not break.
12	Hardened in oil at 1,450, not drawn.	187,400	28,610,000	0.993	0.04772	Did not break.
16	Hardened in water at 1,425, drawn to 1,050 degrees Fahr.	180,700	28,070,000	0.997	0.04850	Did not break.
13	Hardened in water at 1,425, drawn to 900 degrees Fahr.	233,900	28,860,000	0.998	0.04870	Did not break.
15	Hardened in water at 1,425, drawn to 750 degrees Fahr.	240,800	29,220,000	0.994	0.04790	0.744
20	Hardened in water at 1,425, drawn to 600 degrees Fahr.	219,800	30,420,000	0.991	0.04730	0.175
18	Hardened in water at 1,425, not drawn.	212,000	29,960,000	0.991	0.04730	0.175

Test pieces 17, 11, 14, 19, 12, 16, 13, did not break under a deflection at the middle of 1.1 inch.

Test pieces with uniform round cross-section placed on supports 12 feet apart, load applied in middle. Chemical analysis of steel used: Carbon 1.01, phosphorus 0.032, manganese 0.38, sulphur 0.032, silicon 0.13.

water and drawn to 750 degrees Fahr.

Oil Hardening.—The highest elastic limit obtainable with the steel used, when quenched at 1,450 degrees Fahr. in oil, was 187,400 pounds per square inch and this was obtained when the temper was not drawn after quenching. The higher the temperature to which the temper was drawn, the lower the elastic limit fell. Drawing to 400 degrees Fahr. gave 177,600 pounds, drawing to 500 degrees Fahr. gave 160,400 pounds, and drawing to 560 degrees Fahr. 137,500 pounds per square inch elastic limit. As will be seen from the diagram, none of the oil treated specimens broke under a 1.1 inch deflection. The usual "spring temper" given in shop practice would be: Quenching from about 1,450 degrees Fahr. in oil and drawing the temper to between 400 degrees and 575 degrees Fahr. It will be seen that this practice would give an elastic limit varying from about 130,000 pounds to about 175,000 pounds per square inch, or an average of about 150,000 pounds per square inch.

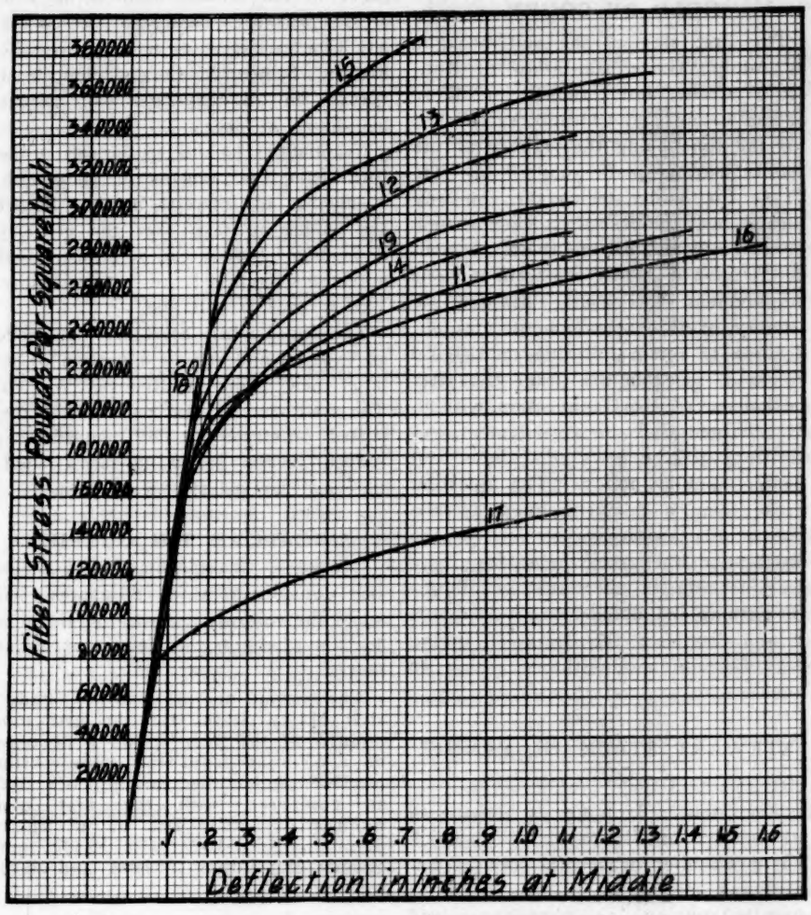


FIG. 2—STRESS AND STRAIN DIAGRAM.

Water Hardening.—When the steel was quenched at 1,425 degrees Fahr. in water and the temper not drawn after quenching, the steel was brittle and broke at 212,000 pounds modulus of rupture, the elastic limit being the same as the modulus of rupture and the deflection of the breaking point being 0.171 inch.

(The term "modulus of rupture" has a conventional meaning. It expresses in pounds per square inch the apparent maximum fiber stress, tension or compression, of a member transversely loaded, as it is just on the point of breaking; the stress being calculated by the common beam theory, with its three important assumptions, which are known to be inaccurate above the elastic limit.)

Drawing the temper to 500 degrees Fahr. gave an elastic limit of 219,800 pounds with the elastic limit still equal to the modulus of rupture, or in other words, the ratio of stress to strain was constant up to the breaking point. The deflection at the breaking point was 0.175 inch. Drawing the temper to 750 degrees Fahr. gave the highest elastic limit, 240,800 pounds per square inch, and the modulus of rupture was then higher than the elastic limit, viz.: 389,000 pounds per square inch. The deflection at the breaking point was 0.744 inch. If the temper was drawn to 900 degrees Fahr. the elastic limit fell slightly, being 233,900 pounds and the specimen did not break under a 1.1 inch deflection. When the temper was drawn to 1,050 degrees Fahr. the elastic limit dropped to 180,700 pounds and the test piece did not break under a 1.1 inch deflection.

The Modulus of Elasticity.

The results of the tests show that the modulus of elasticity is practically constant and apparently independent of the heat treatment given. The modulus of elasticity is difficult to accurately determine, on account of the precision required in measuring the deflections and loads, which vary by very small amounts. It is to be noted that any error in the measurements is likely to make the value of the modulus smaller than it really should be. This modulus of elasticity is the ratio of the stress to the strain, or in this case the modulus of elasticity $= E$, varies as $\frac{\text{stress}}{\text{deflection}}$. Now, all measurements of the deflections have a tendency to be too large and consequently the values found for E have a tendency to be too small, because the blocks and base on which the specimens rest are compressed to a certain amount by the loads on the test pieces, and if not perfectly fitted, the blocks take a certain set which, together with the compression of the support, is measured with the true deflection of the test pieces and added to the true deflections in all the computations. Also, the softer the test piece, the more difficult it is to prevent the supports from denting it under load. The values obtained for the modulus of elasticity varied from 27,150,000 to 30,420,000. It would seem that the higher values are more probably correct and that the true modulus of elasticity of the steel apparently lies between 29,000,000 and 30,000,000 and is probably unaffected by the heat treatment.

Conclusions.

Steel with 1 per cent of carbon, when quenched in cold water from above its "critical point", is usually too hard and too brittle to be used for the making of springs or tools. The theory of the hardening of steel tells us that there are two ways of modifying this hardness and brittleness of the steel. They are: First, allowing some of the carbon fixed in the "hardening" form by quenching, to change back to

the "annealing" form, by re-heating the steel above 400 degrees Fahr. The higher this re-heating or "drawing of the temper" is carried, the softer the steel becomes. Second, using a quenching bath having a lesser heat conductivity. The slower the steel is cooled from above the "critical point" to about 400 degrees Fahr. the more carbon is allowed to change to the "annealing" form and the less the steel hardens. By the second method, steel can be obtained of different degrees of hardness without "drawing the temper" after hardening the steel. These two methods of regulating the hardness of steel in hardening can also be used jointly.

These points are illustrated in the tests. The higher the temper is drawn after hardening, the. lower the elastic limit falls; also a lower elastic limit is obtained with the test pieces quenched in the bath having the lesser heat conductivity, viz., oil. The tests show that the elastic limit of 1 per cent carbon steel can be made to vary from 78,500 pounds per square inch to 240,800 pounds per square inch, by changes in the heat treatment, and that very small changes in the "drawing of the temper" are sufficient to affect the elastic limit of the steel. This proves once more that the heat treatment of steel is a delicate and accurate operation and that to obtain good and uniform results, it is necessary to have means of heating the steel uniformly to the proper temperature and cooling it at the desired rate in a cooling medium, the temperature and heat conductivity of which can be kept reasonably constant.

WASTE GAS FOR POWER.

The announcement is made by A. H. Coolidge, secretary of the board of trade of Big Stone Gap, Va., that in a short time the waste gas from the coke ovens of Wise county, Va., will be available for steam power for manufacturing companies in that territory. Big Stone Gap is in Wise county and is the actual hub of the coal field. There are. within a comparatively short radius, 3,800 ovens, gas from which is to be collected and transferred to a central point and used for the creation ot power for manufacturing purposes.

ELECTRICITY IN CANADIAN IRON MINES.

The Grenville iron mines, which are located about half way between the Canadian cities of Montreal and Ottawa, make an extensive use of electric power for driving the various plants, as well as for lighting, pumping and hoisting. Most of the current is generated by the central power house, erected in 1903, which contains a 750-kilowatt alternating current generator direct connected to a 1,000-horsepower Nordberg-Corliss engine. There is another smaller power house containing a 200-horsepower engine and a 150-kilowatt generator, as well as a supplementary generating station on the Bouquet River for supplying extra power when required.—*Electric Review and Western Electrician.*

PROFIT SHARING PLAN UPHELD BY COURT.

The first step in the suit brought by Adolph Gartz, son-in-law of Robert T. Crane, and formerly an officer of the Crane Co., Chicago, establishes for the time being the legality of the profit sharing plan adopted by the Crane Co., under which the company turned over blocks of stock to some of its employes, paying them the dividends upon it during the term of their employment. Mr. Gartz attacked the legality of this arrangement, and undertook to retain full title to $100,000 worth of stock in the Crane Co. after he had severed his connection with it. He charged that the arrangement was contrary to the laws of Illinois and against public policy. The question arose upon a demurrer filed by Mr. Gartz in a proceeding to recover the stock, and the court held that there was nothing in the laws of Illinois or nothing in public policy to support it and dismissed the demurrer, giving Mr. Gartz one month in which to answer.

STEWART STACK IN, FANNIE OUT.

The Stewart Iron Co. is blowing in its furnace at Sharpsville, Pa., which has been idle for several months undergoing rebuilding. The stack is usually run on low phosphorus and Bessemer irons. The Fannie furnace at West Middlesex, Pa., has been blown out for a short period for repairs, leaving the merchant operations unchanged in the Mahoning and Shenango valleys, 16 in, including Dover, and two out.

RECEIVER FOR BIRD IRON CO.

Upon suit of Fieser & Bentley, a commission iron ore firm of Columbus, O., Capt. H. R. Brown, Dec. 17, was appointed receiver of the Bird Iron Co. with bond of $10,000. Capt. Brown is secretary of the Bird company.

PROPOSES TO REMOVE

Bar Mill to Ironton—Successor Named at Union Stack.

Ironton, O., Dec. 20.

J. W. Arnold of the Kenton Iron & Steel Co., of South Charleston, W. Va., was in the city last week in consultation with Col. H. A. Marting and other local capitalists with a proposition for moving the plant from Charleston to Ironton. The matter will be submitted to the board of trade.

J. H. Ferguson of this city, formerly of Columbus and for some years engaged in the furnace business in New Mexico, has been named to succeed the late Charles Peters as manager for the Rogers, Brown & Co.'s Union blast furnace in this city and will assume his duties at once.

Negotiations looking to the sale of the Bird Iron Co., remain in statu quo. A number of interests in this district are willing to take over the property if pending litigation can be adjusted and purchasers relieved of responsibility. The furnace is still idle.

The Independent Steel Co. has made an experimental run of a portion of its large new plant at Kenova, W. Va. The trial run was on nails and is reported satisfactory. The company has erected several substantial brick buildings and the plant is well-equipped.

SINGAPORE TIN OUTPUT.

George E. Chamberlin, United States vice consul-general at Singapore, has made the following report on the production of tin in the Federated Malay States:

The output of tin from the Federated Malay States for the first nine months of the year shows a decrease of 1,765 tons from the same period in 1908, and a decrease of 623 tons as compared with the first nine months of 1907. The output up to September 30, 1909, was 35,487 tons, against 37,245 tons in 1908, and 36,101 tons in 1907.

The books of the receiver of Milliken Bros., Inc., have been closed, and Fred Deykes has been made general manager of the concern.

NEW PUBLICATIONS.

ANALYZED CHEMICALS.—By John T. Baker, President of J. T. Baker Chemical Co.; distributed gratis by the above company.

TWENTY-TWO YEARS RECORD. — Leaflets distributed gratis by the Goheen Mfg. Co., Canton, O.

COMPARATIVE TESTS OF RUN-OF-MINE AND BRIQUETTED COAL ON THE TORPEDO BOAT BIDDLE.—By Walter T. Ray and Henry K.eisinger; Washington, D. C.. U. S. Geological Survey.

"DIVIDENDS AND DRIVES."—Booklet distributed gratis by the Dodge Mfg. Co., Mishawaka, Ind.

NEWS FROM MANY INDUSTRIES

(In order to assist the post offices in delivering letters to new concerns, it is suggested that the names of incorporators be written in the lower left hand part of every envelope addressed to such new companies.)

New Buyers:—

The following manufacturing companies have filed articles of incorporation:

The American Machine Co., Eau Claire, Wis.; $50,000; by J. C. Tunberg, C. L. Brown, and F. R. Farr.

The Corliss Motor Co., Corliss, Wis.; $1,000,000; by E. E. Smythe, A. K. Stebbins and J. A. Wallis.

The Primm Oil Engine Co., Van Buren, Ind.; $40,000; by B. J. Stranahan, J. M. Primm, A. B. Chauvront, I. C. Mills and W. B. Mills.

The Marsh-Chapron Mfg. Co., Chicago; machinery; $100,000; by Hubert D. Crocker, Geary V. Stibgen and Gilbert T. Noxon, Chicago.

The Hunter Iron Works Co., Atlantic, Ia.; $15,000; by S. G. Hunter, president; Pierce Metz, vice president; and Hugo F. Honig, secretary.

Biglow & Spring Co., Tampa, Fla.; $15,000; foundry, by Silas Biglow, president; Leland Biglow, vice president, and John A. Spring, secretary-treasurer.

The Cates Machine & Bridge Co., Burlington, N. C.; machinery castings, etc.; $125,000; by J. W. Cates, J. M. Cook and H. L. Fowler.

The Eaton Gas Engine Co., Eaton, O., gas engines; $15,000; by L. L. Brown, John E. Parker, A. L. Christman, R. J. Scheld and F. E. Vaughn.

The Progressive Foundry & Mfg. Co., Racine, Wis.; $10,000; by Edward Geb, W. J. Kosterman, Mary E. Geb and Dora Kosterman.

The Winchester Pump Co., Winchester, Ind.; $10,000; pumps and engines; by Directors W. E. Miller, H. F. Hobbick, J. D. Miller and C. A. Hobbick.

The Northern Indiana Brass Foundry, Elkhart, Ind.; $10,000; brass fittings; incorporators, C. G. Schweitzer, Sarah Schweitzer, and V. E. Schlotterback.

The Renewal Trolley Wheel Co., Milton, Pa., $30,000; by Harry R. Frick, treasurer; David R. Rothrock and William Leighty, directors. All of Milton, Pa.

The Guaranty Iron Co., Minneapolis, Minn.; $10,000; by H. A. Brandmier, William Martin, W. T. Rorbach, H. H. Coolidge and C. A. Kirchstein, Minneapolis, Minn.

The American Pattern & Model Co., Chicago; machine shop and foundry; $10,000; by William P. Bond, Ephraim Banning and Francis M. Frost, all of Chicago, Ill.

The Electro-Magnetic Appliance Co., St. Louis, Mo., $50,000; by Harautiun K. Kouyoumjian, Arthur Schwab, Milton A. Heilman, Horace M. Swope and W. W. Seibert.

The Norland Mfg. Co., Williamsport, Pa.; $100,000; by Frank A. Mettler, Wilmington, Del.; O. A. Norland, Frank C. Bowman, and George A. Gamble, Williamsport, Pa.

The Hanke Iron & Wire Works, $30,000; to manufacture and deal in metal goods and other merchandise by Richard Hanke, William R. Kavanaugh and Arthur W. Hanke, Chicago.

The John Rudge Foundry Co., Port Huron, Mich.; $10,000; by Anna Rudge Holland, Mary Amelia Rudge, Winnifred Isabelle Rudge and Ethel Herbie Rudge, all of Port Huron.

The Sheffield Tool & Supply Co., Sheffield, Pa.; $35,000; by Treasurer S. S. Byrner, Sheffield, Pa., and directors J. G. Richards, Mayburg, Pa., G. W. Wood, C. J. Gibson and C. A. Gilson, all of Sheffield, Pa.

The Standard Tie & Mfg. Co., Fairmont, W. Va., the Ross patent mine tie and drum brake, mining machinery, mine cars, tipples and mining and mill supplies; $25,000; by M. L. Hutchinson, Clyde E. Hutchinson, J. J. Ross, C. H. Jenkins and J. F. Cole, all of Fairmont.

New Construction:—

The Smith Mfg. Co., Bessemer, Ala., stoves, is planning to rebuild its plant recently damaged by fire.

The Southern Pipe & Foundry Co., South Knoxville, Tenn., has announced that plans are being prepared for doubling its capacity.

C. C. Truxbury, Grand Rapids, Mich., has had plans prepared for a machine shop 50 x 65 feet, one story, of brick, to be used for the manufacture of automobile engines. The estimated cost is $6,000.

The Gilbert Corrugated Culvert Co., of Austin, Minn., has leased a site in Aberdeen, S. D., where it will establish a plant for the manufacture of steel culverts. One of the buildings will be 40 x 300 feet, a portion two stories high.

The Republic Fence & Gate Co., North Chicago, Ill., advises respecting its recently noted incorporation that it is manufacturing ornamental fencing, gates and farm gates, and is now operating a large plant at North Chicago. The building is of brick, three stories. A warehouse was recently added.

The Sterling Engine Co., Buffalo, has applied for a building permit for the erection of a three-story brick addition to its plant. Construction will be begun immediately, and it is hoped to have the addition in readiness to handle the spring output of engines. The addition is estimated to cost $25,000.

The Hanna-Brackenridge Machine Co., Fort Wayne, Ind., has been compelled by increasing business to leave the location it has been occupying for 12 years, and remove to larger buildings in the rolling mill district. New machinery equipment is now being placed in the leased building, and the work of transfer has been begun.

The Shelby Foundry Co., Shelby, O., has moved into its new office building, and has added the space formerly occupied by the office to the machine shop, where increased equipment has been installed, including one Hamilton planer, 48 inches x 12 feet, a 60-inch boring mill, a 4-foot radial drill, and an 18 x 16 foot lathe.

The Midland Metal Mfg. Co., Ottumwa, Ia., is completing a building for the manufacture of sheet metal specialties. The building is 40 x 60 feet, one story of concrete blocks. The machinery will be installed in January, and it is expected that manufacture will begin Feb. 1. The president of the company is E. W. Phillippe, and secretary, W. A. Heinzman.

A new plant will be erected at First and Stone streets, Spokane, Wash., by the Spokane Ornamental Iron & Wire Works. Work will commmence in the near future, two buildings being erected at first. One will be 60 by 142 feet, partly two stories, and the other 30 by 90 feet, one story. A full equipment for the manufacture of ornamental iron and bronze work will be installed in the new plant.

The Jewett Stamping & Enameling Co., Jewett, O., advises respecting its recently noted increase of capital stock, that this was made for the purpose of increasing the output of its plant in order to provide for its growing business. It expects to install two additional furnaces, as well as larger machinery, and to enlarge its

buildings, but as yet is unable to make a statement as to just what proportions the additional construction will assume.

The Zimmerman Steel Co., Lone Tree, Ia., recently completed a foundry 73 x 116 feet, of concrete and steel. It is equipped with a 60-inch Whiting cupola for gray iron, and a 54-inch cupola for Bessemer pig and scrap; one 60-inch Zimmerman steel converter, 75-horsepower Westinghouse motor, 10-ton electric traveling crane and a double-cylinder air compressor. The plant includes a main building 50 x 200 feet, an addition 60 x 100 feet being equipped as a machine shop. The plant is owned by William Zimmerman and is managed by Mr. Zimmerman and his four sons, who started in business 10 years ago, making stump pullers in a shed 14 x 16 feet. They estimate that the present value of their plant is $200,000.

The Youngstown Foundry & Machine Co., Youngstown, O., which has been making extensive improvements at its East Boardman street plant, has installed one 15-ton and one 25-ton air furnace and a yard crane runway with 10-ton traveling crane. The company is also installing a number of roll lathes, and expects to start up about Jan. 1. This plant is to be known hereafter as the "roll department" and the product will be chilled and sand rolls and high grade air furnace castings. At the iron department on Ardale street, cupola and air furnace castings will be made. The office, machine, blacksmith and pattern shops are located at the iron department. The open-hearth furnace formerly operated by the company, has been dismantled and the entire steel casting equipment disposed of.

The Denver Brass Works Co., Denver, Col., which has been compelled to remove its foundry to a new site by the condemnation of the old site for boulevard purposes as recently noted, was established about 26 years ago between Thirteenth and Fourteenth streets on Lawrence street, by its present owners, W. T. and John J. Davoren. The new building to which the company will remove will be ready for occupancy about Jan. 1, and is 30 x 132 feet, with a skylight in addition to ample light through the windows, and thoroughly modern in equipment. The new furnace will have a capacity of 300 pounds. W. T. Davoren, the head of the company, has just signed a contract with one railroad company for $6,000 worth of work per month throughout 1910, in addition to a number of smaller contracts. J. J. Davoren, in charge of the operation of the plant, has invented a new method of treatment, the successful operation of which has resulted in railroads placing a number of orders with the Denver Brass Works Co.

General Industrial:—

The Prime Steel Co., of Milwaukee, has increased its capital stock from $50,000 to $350,000.

William Thorndyke, assignee of the Model Brass Foundry, Cincinnati, has reported to the insolvency court the sale of the personal property of the foundry at a public sale for $435.

The Mumford Molding Machine Co., 36 Church street, Philadelphia, has been organized to sell the foundry molding machine heretofore handled by the E. H. Mumford Co. The machines will be manufactured for the new company by the Q. M. S. Co., Plainfield, N. J. W. D. Sargent is president, and E. H. Mumford is vice president and general manager.

The Union Machine Co. Inc., St. Paul, Minn., whose incorporation was recently noted, recently finished its building and has fully equipped it with modern machinery, including electric power and light. While it does a general machinist business, including gear cutting, die sinking, tool making, etc., it is about to begin the manufacture as a specialty, of the D. & L. throttle rod stuffing box.

The plant of the Fisher Foundry & Machine Co., at Ford City, Pa., has been bid in at $71,600 at a public auction of the trustee in bankruptcy conducted in the local courts. The sale was made to attorneys acting in behalf of parties whose identity has not been disclosed. The plant consists of modern buildings and equipment and a site of about ten acres of ground.

Instructions have been issued by the Federal court at Columbus, O., to W. F. Foos and H. D. Maize, receivers of P. P. Mast & Co., of Springfield, O., to make formal application for an order of sale, the initiative having been taken by the chairman of the creditors' committee. If the majority of the creditors favor selling the court application will be filed. It is said that an offer of $235,000 for the plant has been renewed by Chicago parties.

Trade Notes:—

H. C. Matlack, heretofore in charge of the pig iron and coke department of Frank Samuel, has associated with himself G. Walter Bates, formerly of the firm of Wilson & Bates, bar iron merchants, and will conduct a pig iron and coke business under the name of Matlack & Bates, with offices at 1119 Pennsylvania building, Philadelphia.

The Petroleum Iron Works Co. announces that having erected a new works at Sharon, Pa., it has closed its works at Washington, Pa., and removed its main office to Sharon. In order to avoid delay, all mail intended for the Petroleum company's main office should be sent to Sharon, Pa.

The Boston branch of the E. Buxton & Son Co., with offices at 200 Summer street, Boston, and the George B. Doane & Son Co., with offices at South Boston, have been consolidated as the Buxton, Doane Co., iron and steel scrap, with offices at 18 Midway street, Boston, where will be located George B. Doane, Alfred H. Knight, William S. Buxton. The offices formerly occupied by the Boston branch of the E. Buxton & Son Co., will be discontinued. Walter A. Buxton will continue his duties with the E. Buxton & Son Co., whose offices and headquarters are at Worcester, Mass. The new company will continue the business formerly occupied by the Boston branch of E. Buxton & Son Co., and by George B. Doane & Son Co.

Fires:—

The car shops of the Southern Railway, Columbia, S. C., were damaged to the estimated amount of $15,000, Dec. 9.

The American Malleable Iron Co.'s foundry at Lancaster, N. Y., near Buffalo, was seriously damaged by fire Dec. 10, the loss being estimated at $20,000.

The Wonham & Magor Car & Mfg. Co.'s works at Athenia, N. J., was damaged to the amount of about $100,000, Dec. 9, the loss being covered by insurance.

The plant of A. B. Norton Co., Boonton, N. J., structural material, was damaged Dec. 9, the loss being estimated at $15,000 covered by insurance. The fire originated from an explosion in an oil tank.

The foundry of the Pulaski Foundry & Machine Co., Pulaski, Va., was badly damaged Dec. 7, a number of valuable patents being lost. The damage is placed at about $3,000, with about half that amount of insurance.

The plant of the Orr Foundry Co., Orrville, O., was badly damaged Dec. 7, including the loss of a number of valuable patterns. The money loss is placed at $3,000, with $1,000 insurance. Steps are to be taken to rebuild.